An Introduction to Bilingualism

Principles and Processes

Edited by

Jeanette Altarriba
Roberto R. Heredia

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Preface

Jeanette Altarriba and Roberto R. Heredia

We take great joy and honor in presenting *An Introduction to Bilingualism: Principles and Processes* to students, teachers of bilingualism, and the scientific community. This volume is intended for use in undergraduate courses and undergraduate seminars such as *The Psychology of Bilingualism* and *Second Language Acquisition*, as well as graduate courses in psycholinguistics with emphasis on bilingualism or second language learning. It is our hope that this volume will provide the undergraduate and graduate student with a general overview of the methods and theories used in the broad domain of bilingualism. Indeed, this interdisciplinary approach is reflected in the various topics covered in this book, ranging from early childhood intellectual development to the educational and social-cognitive challenges, if any, faced by the "normal" and aging bilingual, as well as the maturing bilingual brain. Although other excellent and seminal introductory textbooks (e.g., Grosjean, 1982) are available, these books were in need of updating and the inclusion of new developing areas of bilingual inquiry that include cognitive aging (Schrauf, this volume, chapter 5), creativity (Simonton, this volume, chapter 7), the social and cultural context perspective (Pérea & García Coll, this volume, chapter 10), communication disorders (Kohnert, this volume, chapter 13), and sentence processing (Gianico & Altarriba, this volume, chapter 4). We would be remiss, however, if we did not cite Grosjean's (1982) classic text and Romaine's (1995) volume that we have been using in our Psychology of Bilingualism class for the last 7 years and Hamers and Blanc's (2000) excellent book that triggered and shaped the direction and focus of the current volume. Finally, it is hoped that we succeeded in providing the bilingual student, teacher, and researcher with an updated and interdisciplinary perspective about the intricacies of the bilingual mind.

References

Grosjean, F. (1982). *Life with two languages: An introduction to bilingualism*. Cambridge, MA: Harvard University Press.

Hamers, J. F., & Blanc, M. H. A. (2000). *Bilinguality and bilingualism* (2nd ed.). Cambridge, MA: Cambridge Press.

Romaine, S. (1995). *Bilingualism*. Cambridge, U.K.: Blackwell.

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I, Jeanette, feel grateful that the colleagues who contributed to this book acknowledge the importance of the topic in all its variations and continue to serve as role models for other scientists in this area. In particular, I thank my close colleagues (and you all know who you are) for providing, as Norman Segalowitz researcher and scholar would say, an "academic family" affording guidance and friendship and a constant source of stimulation to create new knowledge and to share that knowledge all around the globe. I join Roberto in thanking our students for motivating us, making us think, and providing those wonderful "Ah-ha!" experiences in the laboratory. We do indeed live for those moments of discovery, and we are happy we can share the wealth of our knowledge with you, as inspired by our mentors and our colleagues. This book was truly something that Roberto and I did to bring together the many worlds of bilingualism in one place, and we are grateful that Erlbaum sought to further our journey through to the completion of this book. My family is a constant source of guidance and inspiration and their pride in my work and accomplishments shall far outlast the writings in this book. It is to them that I dedicate the realization of this volume.

Finally, we wish to acknowledge our friends who are too numerous to name and our wonderful families—related, extended, and adopted throughout the world. It is their love and support that always motivates and encourages us. Este libro está dedicado para todos ustedes.

Con Cariño,
Jeanette Altarriba and Roberto R. Heredia

1 INTRODUCTION: THEORETICAL AND METHODOLOGICAL BACKGROUND

Chapter 1

Introduction

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Aspects of Bilingualism

Mention the word *bilingualism* and almost anyone will tell you a story or an anecdote about how they attempted to learn a language, someone they know who is good with languages, or languages they wish they could master. It seems as though everyone has a connection to the idea that humans possess a capacity to learn aspects of more than one language. Actually defining the term *bilingualism* is a much more complex venture. Earlier definitions relied on distinctions on where and when languages were learned while later distinctions relied on how easy or difficult it was to engage in cognitive tasks across as compared to within languages (see Gass & Glew; Heredia, this volume, for a review). In fact, it is probably best to say that an individual is as bilingual as is demanded by a particular task or context. Take for example a person who is fluent in English but cannot read nor write in French with a great degree of proficiency. Yet, they can carry on a conversation in French almost as easily as they can in English. Could we say that this person is bilingual as a speaker of English and French? Perhaps we would agree to that designation. On the other hand, we might feel the need to designate a bilingual as someone who can read, write, and speak fluently in more than one language, and without fluency in all three aspects, would not be called a bilingual. Thus, it may be the case that defining this term is much too complex a question, and suffices to say that we can use the context we are working in to assist us in assessing degree of bilingualism and leave it at that, at present.

Thus, our goal is not necessarily to define this term, but to unpack all that comes with it—the social, cultural, educational, cognitive, developmental, biological, psychological, and linguistic components that would together assist us in understanding how humans acquire, process, and use more than one language. We know, for example, that language is learned within a sociocultural environment and that culture, *per se*, has a great influence on the pragmatics or uses of language within a particular group of language speakers (Kitayama & Markus, 1994). How do social contexts affect the learning and maintenance of words in a given language? We also know that the brain plays an important role in processing language. But what happens when the brain has difficulty in organizing and otherwise maintaining language, as a result of an injury or damage? It is also the case that learning languages may vary as a function of age of acquisition. But is it truly the case that learning languages beyond a critical period often times fails to produce a fluent or proficient speaker of a language? These are just some of the questions that are examined in the current text. For the study of bilingualism is not one that is undertaken in isolation; but rather, many different factors that affect human and cognitive development go into the learning and changes that take place as one learns and uses multiple languages.

The study of bilingualism is rooted, in part, in educational assessment and testing, and historically, instruments were developed to examine language fluency and its interaction with human intelligence (Royer & Carlo, 1993). This was perhaps one of the darker eras of bilingualism and the study of bilingual language development (see Marian, this volume). The notion of culturally biased testing served to initiate a long-standing debate on the possible consequences of bilingualism in terms of human information processing. Fortunately, with the advent of various forms of cognitive and implicit testing, and with the development of the idea that testing should be culturally relevant and at the very least minimize or eliminate bias that could influence findings, bilingualism, particularly in the United States, has moved more and more toward its identification as an asset rather than a liability (Owens, 1996). It has long been the case that bilingualism has been more prevalent than monolingualism in many of the countries of Europe, Asia, and Central and South America. However, bilingualism as a common occurrence is only now being recognized more in the United States and parts of North America. Migration and immigration have contributed to the increase in the use of languages other than what might be considered the native language in many parts of the world, more so than in the historical past. Thus, the study of bilingualism is ever more increasing and ever more present than in any century in the past (Bhatia & Ritchie, 2004).

To understand how one goes about studying the bilingual speaker, one has to know a bit about language, biology, culture, and society, at the very least. A measure of politics and educational policy should be thrown in, as well, as they are moderators of how languages are incorporated into learning settings and how languages are modified due to societal norms and guidelines. Yet, a basic background in how a bilingual develops and the route that is navigated from naïve learner to fluent speaker can help to provide a unifying idea or worldview on what it means to be bilingual and how bilinguals function in different contexts. Thus, one of the aims of the current text is to weave together all of the different levels on which one might examine the bilingual speaker so as to provide a unified view of the bilingual as someone who is more than just the speaker of multiple languages. This text is meant as an introduction to the various levels at which one can examine the implications of being bilingual and as an introduction to the theory and research that provides the framework from which we can summarize the mechanisms that influence acquisition and maintenance of a second or third language or more.

For some, the learning of a new language is akin to learning how to play a musical instrument or learning a new computer programming software system. It involves the acquisition of

symbols that represent different concepts or ideas in memory. Thus, it stands to reason that if we learn a new symbol set, we may also be learning new ideas, as well! This is one of the more exciting parts of learning a second language and becoming a bilingual—the chance to have a new set of ideas and concepts that are represented by a new set of utterances that are novel and nonoverlapping with one's native language. While the long-standing debate on the interaction between language and thought and which comes first has not truly been solved, as it were, it is still the case that one ultimately can point to ideas and notions in one language that basically *do not translate* into any other. It is the novelty or uniqueness of multiple languages that one might argue makes bilinguals truly unique in terms of their thinking, the way they represent and approach problems, and the roles that they may take on in basic role playing exercises. In fact, today it has been argued and data have been gathered to suggest that bilingual children may outperform their monolingual counterparts on basic word games, role playing, problem solving, word naming exercises, and various other venues (see Simonton, this volume). To provide an example, take the game *Balderdash*. In this well-known parlor game, an individual presents a word to a group of players. Each in turn is to write down a definition for the word—one that sounds convincing enough that he or she can get other players to vote in favor of their definition. Of course, someone might produce the correct definition, but the words are typically not very common in the language in which the game is being played, making it unlikely that anyone would guess the correct definition. Then, the definitions are revealed including, in random order, the correct one. If someone chooses an incorrect definition because it seems plausible and believable, the author of that definition is awarded a certain number of points. In one such instance, a group of primarily English monolingual speakers was playing along with a single Spanish-English bilingual (one of the co-editors of this text, in fact!). The word that appeared was *arenose*. Individuals in the group worked on their own definitions, as the Spanish-English bilingual considered the root of this word and the Spanish word for sand which is *arena* and its adjective *arenoso* or *anrenosa*. Of course, this is also a word in English, but the bilingual was searching for a connection related to the root of the word in Spanish to then create a plausible definition in English. Ultimately, the bilingual, though not particularly convincing to the group, did produce the correct English definition—sandy, as in a sandy place or region. Certainly, an avid reader of any language that has its roots in say a Germanic or Romance background might have generated a reasonable decision. But amongst a group of English speakers, it was the one bilingual speaker who was easily able to discern a definition that in fact was correct.

Thus, bilingualism is an extension or elaboration of first language acquisition, but with many, many more avenues and issues of complexity. Adding a single language does not just add the words and the grammatical rules that direct how those words are to be joined together. Rather being bilingual entails another view of the world and ways to think about and describe the world that expand our views. It takes Noam Chomsky's (1957) notion of novelty, as the cornerstone of human language, and multiplies it exponentially! But why embark on a comprehensive study and overview of bilingualism as a subject of exploration? The next section provides a few ideas that begin to address this question.

Why Study Bilingualism?

It has been argued that language is that which makes us human, which separates us from other nonhuman species. If this is the case, what if we learn more than just one? While it is arguable

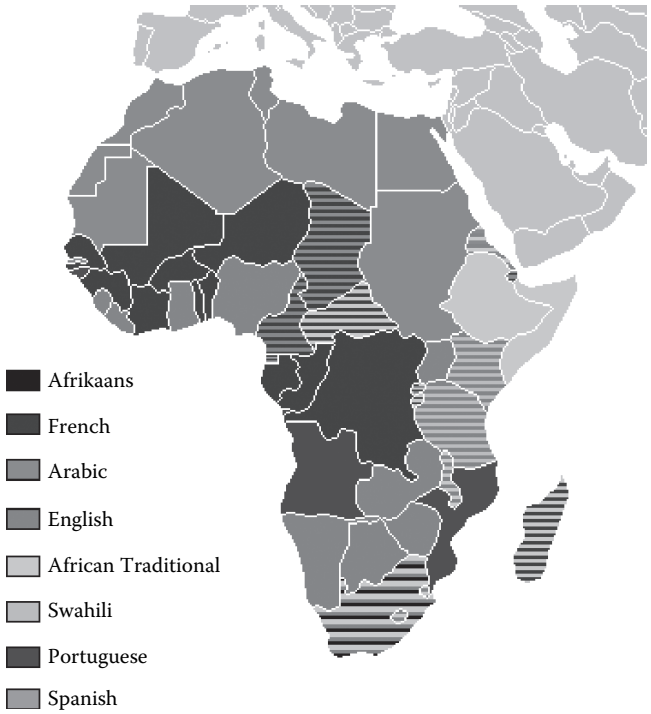

Figure 1.1 Commonly spoken languages in the African continent (Source: Yahoo.com).

whether or not other species would need our language *per se* (that is, does a whale really need to be able to ask when the next movie is going to begin?), it is the case that communication systems evolve across species to be able to transmit messages and assure some level of survival for members of the group. Some species' system of communication focuses heavily on the characteristics of a food source, such as that of bees, while others might involve signaling danger, the availability of a mate, or a member's reproductive readiness (Clark, Eschholz, & Rosa, 1994). Thus, one of the most important reasons to examine any language is that it is a primary means of *communication* among members of a group or across more than one group. Noting, as mentioned earlier, that bilingualism is much more commonplace now than ever before, it stands to reason that knowing more than one language can place one in the position of being able to communicate with more and more groups of people across the various countries of the world. Even within a given country or continent (e.g., the existence of dialects), the diversity of language can mean that one necessarily must become immersed in more than one language, just to be understood (see Figure 1.1, for example).

Moreover, if one is familiar with the written language, as well as the spoken one, one can read information about another culture and a different way of life, as compared to their own. Thus, one can learn about other ways of knowing and ways of thinking and again, learn new ideas that were never expressed in one's native language!

It is also the case that learning about bilinguals and ways in which they learn, use, and maintain their languages provides clues to the ways in which we can *improve the teaching of a second*

language. Thus, another reason for understanding how bilinguals process information, broadly speaking, is so that we can discern the characteristics of fluent or proficient speakers and engender those ideas into new methods of teaching a language to a nonspeaker of that language. Are semantic or meaning-based methods the best ones to use? Does immersion really lead to better fluency and conceptual understanding of a new language? Is it helpful to merely repeat words in a new language multiple times? What about the setting or the environment in which a language is learned and its contribution toward developing proficiency? Methods involved in learning a second language, as well as in bilingual education, are still in their infancy in terms of their research and development. But might understanding and examining the ways in which bilinguals use their languages and retain language information better inform the development of those methods? The answer is a resounding, "Yes!" Therefore, there is a very important application of research and investigation into the underpinnings of multiple language fluency—the need to develop a system that is efficient and effective for teaching new languages.

A third reason why we may want to explore this field in general is at once, historical and anthropological. There are roughly 4,000 known languages in the world. If we combine and recombine language couplets or triplets, there is an extremely large number of combinations one might conceive of in the world for a speaker of more than one language. Yet, in many cases, *understanding language change and the evolution of languages* is complemented by our knowledge of the history of particular groups of speakers. In order to understand how they thought, how they worked, how they lived, and how their societies have developed and evolved, it is often necessary to learn the languages that are considered older or more ancient compared to our modern languages. That is, in order to best understand other worlds, past as well as present, we need to be able to understand how languages changed over time, how they were spoken in the past, and how those languages that left a written record were organized in terms of their grammatical structures. Could becoming bilingual in ancient languages divulge some new information about ancient worlds and peoples from the distant past? While linguists who work in anthropological settings might be the ones to set out to discover language, they will best be able to understand the culture and ways of thinking of a group if they can become immersed in their language—nuances and all.

Fourth, one of the reasons we approach topics such as psychology, anatomy, physiology, biology and so on is to better understand human functioning in the typical or expected sense. That is, we want to find out how humans react and respond to their environment and how they represent knowledge in the typical, everyday setting. Doing so would give us a better idea of how to diagnose a problem when the system breaks down. Knowing how the mind works and how bilingual speakers store and use information might provide a clue to *facilitating treatment of bilinguals who suffer from brain impairments* as a result of injury or trauma. In fact, it is known that bilingual aphasics (individuals who have lost language functioning in the brain due to some form of injury) have exhibited various forms of recovery of their languages (see Vaid, this volume). They may at once recover both languages to some degree, or see-saw between languages on alternate days or weeks. In other cases, only partial recovery occurs for the less dominant language while the language that was considered dominant pre-injury returns to past levels of proficiency. Knowing something about language storage in the brain, and how the "bilingual brain" may function similarly or differently from that of the nonbilingual might allow for the development of methods and plans of treatment that could lead to optimal recovery. In fact, it is known that in the process of learning how bilinguals store and represent information cognitively, researchers have uncovered general principles and facts about human language processing, in general. In other words, the gains in this area of research and exploration are general and not just relegated to the bilingual speaker.

Finally, some people want to know about bilingualism because they truly have a love for language and a love for culture and people. Most would agree that knowledge of a foreign language facilitates travel to distant countries, the reading of literature and history from other cultures and other eras, and an enjoyment and interest in film and visual culture from other worlds. Simply the enjoyment of knowing how others think and view their world would draw individuals to appreciate the enterprise of becoming bilingual and learning more about bilingualism, as a whole. With the advent of various kinds of technology that make viewing and encountering information in other languages easier than ever, there is an ever-increasing desire for people to understand the process of becoming bilingual and ways in which they can facilitate their learning of other languages. The hope is that this book will also stimulate the desire to learn about the field of bilingualism, theoretical and applied, and spawn new and interesting research directions and directions of inquiry that will further the field in future years.

Overview: Chapters 2–14

This text is divided into five sections, as follows:

Section I.	Introduction: Theoretical and Methodological Background
Section II.	Cognitive and Neurological Mechanisms
Section III.	Creativity and Developmental Principles
Section IV.	Social and Sociocultural Processes
Section V.	Linguistic Principles and Applied Perspectives

Section I focuses on a discussion of the methods that have been used and are currently used in the study of bilingual information processing of various kinds (Marian), as well as the historical developments in the study of bilingual memory and language processing (Heredia). Memory is the backbone to the development of all cognitive abilities that are undertaken by a bilingual speaker. Thus, it is important to understand the mechanisms by which bilinguals encode, store, and retrieve information, the ways in which different characteristics of words are learned and represented, and how one might trace the development of language ability from a novice to a fluent bilingual. Methodology is the cornerstone of all science, and the field of bilingualism, as a research endeavor, is no different. Thus, the work of Marian describes the tools used in the field to uncover properties of bilingual language, memory, cognition, and perception, and the ways in which researchers employ those tools in the discovery of new knowledge. Together, these two chapters set the stage for the chapters that follow—chapters that build on history, method, and theory, as described within this first section.

The second section builds on the first by discussing the data and findings that have been reported with regards to psycholinguistic perspectives on bilingualism. How does language influence behavior? How do behaviors demonstrate or illustrate the processing of language? This bidirectional influence and relationship is described in the work of Gianico and Altarriba, thereby providing ample illustrations of how the methodologies discussed in the first section materialize in new and interesting ways in experimental settings. Their work introduces the reader to the basic tasks and procedures that are used to examine the representation of words and units larger than words, in the bilingual language system. This chapter also serves as a primer on the basics of language grammar, in general, by discussing its components—phonology, semantics, etc.

This chapter also provides background on the types of deficits that are acquired through the aging process and discusses evidence related to the processing of language at various levels—syntactic, phonological, and the like. Now what happens to a bilingual's language abilities as they age? The work by Schrauf discusses both monolingual and bilingual aspects of aging, as related to language use and language representation. In fact, the previous chapter provides a smooth transition to this work, as that chapter laid the foundation for the understanding of the various parts of grammar that are inherent in most known human languages. This section as a whole ends with the work of Vaid that is squarely focused on the bilingual brain. How does the bilingual brain store information on its two languages? After having learned about the storage and processing of language, and the processes that occur with aging, this final chapter discusses the possible roots of those processes and how it is that we have come to know (i.e., the methodology) about the brain's functioning in more than one language environment.

With a basic background in the historical and theoretical context of the study of bilingualism in language and neural contexts, section III further unpacks the field by examining the developmental principles that guide language learning (Nicoladis), as well as the result of the application of some of those principles—the establishment of creativity (Simonton). How much does family and the use of language in the household influence the patterns of language acquisition and the preferred pragmatic uses of two languages for bilingual children? How do children establish the distinctions between concepts and the words that label them, in two or more languages? Nicoladis discusses the developmental principles that guide the learning of more than one language and how they interact with the surrounding context involving people, educational, and societal entities. With the right combination of settings, feedback, and instruction, a bilingual may develop certain degrees of creativity that are enhanced by their bilinguality. Simonton attempts to explore the possible link between bilingualism and creativity. Various examples of tasks that are used to assess creativity are discussed, providing the reader with a comprehensive overview of this field of study—one that is relatively new to the empirical side of bilingual research.

The fourth section of this text is devoted to some of the more popular approaches (at least to many students!) to the study of bilingualism—those that involve an examination of society and culture and their interaction with the process of learning and using multiple languages. The work of Vega explores the ways in which bilingual speakers incorporate new languages and the biases or stereotypical beliefs regarding speakers of those languages into their own identities and concepts of "self." Being bilingual is often linked to being bicultural, as well. What are the dimensions involved in a given society that might lead bilinguals to either assimilate to a particular group, or to remain part of a designated out-group? How much of language is closely tied to one's role or place in a society? What are the attitudes inherent in a given society with regards to bilingual speakers that actually shape the ways in which bilinguals view themselves and each other? These issues are all finely reviewed within the chapter provided by Vega. Perea and Garcia-Coll broaden the discussion begun by Vega by discussing the historical and political roots of cultures and how they contribute to the perspectives those cultures reserve with regards to their bilingual populations. Are there historical roots that helped to define how bilingual speakers would be perceived and treated within a particular community? Historically, and to the present, how have migration and immigration contributed to the perspectives people hold regarding individuals who reside within their bilingual communities? These ideas are explored and expanded upon in this final chapter within this section. The reader, therefore, comes away with an understanding of the bilingual individual in society both from an individual perspective and from a group perspective, as well.

The final section within this book (last, but by no means least!) is devoted to issues regarding linguistics and aspects of languages themselves that contribute to differing levels of bilingual fluency, as well as the educational principles and policies that have worked to shape the status of emerging bilingualism within societies today. Cook explores how different views of language and the learning of language influence the acquisition of a language, in a more or less formal way. What attitudes and beliefs moderate one's desire or motivation to acquire a language? What linguistic properties are necessary in order to fully learn a language, and what factors moderate success in doing so? Gass and Glew move one step further in identifying the different ways in which second language learners characterize their learning, and how behaviors related to learning a second and even multiple languages are governed by the perspectives learners have of themselves. They also aptly describe, by example, the various stages involved in learning a second language and the influences of the first on the learning of the second. This work leads nicely into Kohnert's discussion of second language impairments and their emergence in a developmental perspective. How second languages evolve and interact with individual factors and ultimately, brain structures, is the focus of this very novel and interesting chapter. Finally, the work of Garcia brings all of these concerns together to bear on the educational system specifically within the United States and those aspects that are concerned with the learning of more than one language. The United States provides a particularly interesting environment in which to examine the emergence of bilingualism and the ways in which history, politics, beliefs, and social mores influence the direction education takes, thereby influencing who is likely/not likely to become bilingual and the attitudes and stereotypes that come with this kind of linguistic challenge.

Summary

The study of bilingualism from a theoretical, methodological, applied, and pragmatic perspective is the general subject matter of this text, as illustrated in cognitive, biological, developmental, social, linguistic, and educational perspectives. The text seeks to serve as a compendium of knowledge regarding the field of bilingualism and to introduce the basic processes and principles involved in the learning and maintenance of a second and third language, and beyond. This book should emphasize the importance of Bilingualism as a topic of study and inquiry, as it describes the bulk of people's language use in the world today and helps us to understand the basic workings of human language, in a more general way. Those interested in learning about other cultures, traveling to other worlds, understanding history and other topics in the language in which their documents were created will no doubt find this topic of immense interest and direct relevance to their daily lives. This text should also provide a basis from which future research questions may be asked and explored, as the field continues to grow and expand in ever more interesting ways.

References

Bhatia, T. K., & Ritchie, W. C. (Eds.). (2004). *The handbook of bilingualism*. Malden, MA: Blackwell Publishing.

Chomsky, N. (1957). *Syntactic structures*. The Hague: Mouton.

Clark, V. P., Eschholz, P. A., & Rosa, A. F. (Eds.). (1994). *Language: Introductory readings*. New York: St. Martin's Press.

Kitayama, S., & Markus, H. R. (Eds.). (1994). *Emotion and culture*. Washington, DC: American Psychological Association.

Owens, R. E. (1996). *Language development: An introduction*. Boston: Allyn and Bacon.

Royer, J. M., & Carlo, M. S. (1993). Assessing language comprehension skills in cross-cultural settings. In J. Altarriba (Ed.), Cognition *and culture: A cross-cultural approach to cognitive psychology* (pp. 157–175). Amsterdam: Elsevier Science Publishers.

Chapter 2

Bilingual Research Methods

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Bilingual Research Methods: Introduction

In 1924 the United States Congress passed what became known as the Immigration Restriction Act, a law that regulated immigration to the United States for many years and served as the basis for discriminatory immigration policies favoring immigrants from Western and Northern Europe over those from Southern and Eastern Europe. The law had an eugenic intent (eugenics refers to "improvement of the gene pool") designed to halt the immigration of supposedly *dysgenic* groups, groups that purportedly contributed to a decline of the gene pool. The Immigration Restriction Act relied in part on data from seemingly scientific studies (Brigham, 1923; Goddard, 1914) as well as a Public Health Service project that tested the intelligence of different groups and found that some immigrant groups—for example, Italians and Eastern European Jews—scored lower, often below average, and sometimes even in the "feebleminded" range, compared to other groups. Herrnstein and Murray, in their much-publicized 1994 book, *The Bell Curve*, described these events as follows: "In the early 1920s, the chairman of the House Committee on Immigration and Naturalization appointed an 'Expert Eugenical Agent' for his committee's work, a biologist who was especially concerned about keeping up the American level of intelligence by suitable immigration policies" (p. 5).

One can just imagine how, in the years that followed, streams of immigrants lined up at Ellis Island to undergo comprehensive medical examinations, coupled with psychometric tests to assess their intellectual abilities. Never mind that many of these immigrants spoke not a word of English, while their testers did not know many of the languages that were represented among those fresh off the boats. Imagine yourself as a Ukrainian farmer, illiterate, never having taken a paper-and-pencil test in your life and speaking no English, after a long and stressful journey to a country on the other side of the world, having to take an IQ test. Is it any wonder that some groups—for

example, British, Dutch, German (whose languages were from the same Germanic family group as English and shared many common words and word roots)—had fewer problems understanding their testers and tests than other groups—for example, Russian, Polish, Italian (whose languages differed from English a lot more)? Is it any wonder then that some groups did better than others on these psychometric tests for reasons that had nothing to do with intelligence?

The Immigration Restriction Act of 1924 was later repealed and, looking back, we can safely say that those mental tests were biased, that they did not take into account the linguistic and cultural background of the test takers. Mental tests have come a long way since then and test makers are acutely aware of the need to create assessment tools that are linguistically and culturally sensitive. Yet, accomplishing such goals is not an easy task. To this day, mental tests seem to yield higher scores in some groups than in others (e.g., Herrnstein & Murray, 1994) and arguments about the lack of cultural and linguistic/dialectal fairness of these tests abound. Some of these cultural and linguistic biases are due to the fact that those who conduct research with linguistically and culturally diverse populations continue to be trained primarily in a context that focuses on middle-class English-speaking white populations and have a limited understanding and knowledge of what studying cognitive abilities of other groups entails. Studies focusing on linguistically and culturally diverse groups frequently yield seemingly contradictory findings, and conclusive answers to research questions remain elusive. The dearth of training on issues related to cognitive performance in linguistic and cultural minorities, together with failure to take into account relevant experimental variables, continue to pose a challenge in obtaining a clear picture of cognitive abilities in diverse populations. There is also the risk of inappropriately driving public policy, for instance, on issues related to raising bilingual children or to bilingualism in the classroom.

In this chapter, we take you through the steps necessary to conduct a research project with bilinguals, multilinguals, or second- and foreign-language learners. We discuss some of the issues in designing a study, selecting participants, putting together materials, collecting and analyzing data, and then disseminating the findings among an audience of peers. We consider strengths and weaknesses of different approaches, and discuss how to avoid the most common pitfalls in conducting bilingualism research and in interpreting the findings of already existing studies. The first part of the chapter introduces key terminology and concepts necessary to embark upon a research project. The second part of the chapter samples research areas that fall under the umbrella of bilingualism and illustrates how methodological differences and limitations can influence findings. The final part of the chapter considers specific methodological aspects in conducting a study with bilinguals. Sample questions and research projects, as well as resources for further information, are included at the end.

This chapter is intended for advanced undergraduate and graduate students and for anyone new to research with linguistically diverse populations. Most frequently, these researchers find themselves in the fields of psychology, linguistics, communication sciences and disorders, or education, but can work in other disciplines as well (e.g., anthropology, neuroscience, etc.). Though one chapter alone is not sufficient to provide comprehensive training in such a complex area, it can serve as a starting point for those who are interested in bilingualism and want to ensure that they avoid the most common mistakes along the way.

Designing a Research Project with Bilinguals

In this part of the chapter, we introduce some of the key concepts necessary for familiarity with both the vocabulary used in research and the basic procedures in running a study. If you have

never taken a research methods course before, much of this information will be new. If you are already familiar with the basics of research design, this will serve as a refresher tailored specifically toward research with bilinguals and multilinguals.

Observational and Experimental Studies

Research with bilinguals usually focuses on understanding cognitive, linguistic, and behavioral aspects of bilingualism. One way to accomplish this is to observe human cognitive and behavioral performance in natural settings, record such performance, and describe it for scientific understanding. This is usually known as *naturalistic observation* or *descriptive research*, because it describes naturally observed phenomena, instead of experimentally controlled or manipulated ones. An example of observational research with bilinguals may be observing a bilingual child on a playground and writing down the words the child uses in each language. Naturalistic observation is also sometimes referred to as *correlational research* when the focus of the study is on establishing a relationship between two or more variables. For example, one may find that the larger the vocabulary in a bilingual's second language, the higher his/her score on an intelligence test. You may have already heard the statement "correlation does not imply causation." In correlational studies, one is unable to make causal judgments about the effect of one variable on the other. In the case of the relationship between vocabulary size and intelligence, the only conclusion that can be reached is that the two variables are related. Correlational research is especially useful when it is not possible to manipulate a variable experimentally (e.g., due to ethical reasons, or because the event took place in the past) and the researcher is limited to recording behaviors as they occur naturally and then analyzing the collected data. Note that correlational research, while sometimes relying on actual statistical correlations such as Pearson's *correlation coefficient* (*r*), is not limited to them in data analyses. That is, there is a difference between correlational research as a methodology and statistical correlation as a tool for data analysis. Other statistical analyses (such as *t-tests* and *Analyses of Variance*) can also be used in correlational studies, as long as the data that are being analyzed have been collected using the observational method, without active manipulation of any variables on the part of the experimenter.

Alternatively, one may design an experiment and look at how changing variables influences cognitive and behavioral performance. This is known as *experimental research*. The distinguishing feature between experimental research and observational research is whether or not the experimenter is able to manipulate variables experimentally or is limited to measuring them as they occur naturally. An example of experimental research with bilinguals may consist of asking bilinguals to label pictures in either their first or their second language and comparing reaction times in this picture-naming task across the two languages. Experimental research makes it possible to control variables (such as word frequencies or word lengths in the two languages) and in general provides greater control over the behavioral and cognitive processes of interest. It makes hypothesis testing easier and allows one to draw causative inferences, that is, it allows one to establish some type of cause and effect. However, experimental research is not always feasible, practical, or ethical. For example, if one were interested in studying bilinguals' flashbulb memories—memories of dramatic public events such as a presidential assassination or a great disaster—across the two languages, one could not create such memories experimentally and would have to use the naturalistic approach by conducting first- and second-language interviews about, for example, bilinguals' memory of the 9/11 attacks on the World Trade Center towers and the Pentagon.

Longitudinal and Cross-Sectional Research

Longitudinal studies are studies that follow experimental participants over a period of time, be it months, years, or decades. In longitudinal studies, performance at Time 1 is usually compared to performance of the same individual or group of individuals at Time 2. This is different from *cross-sectional* research, in which different individuals or groups of individuals are compared to each other at the same point in time. For example, if one was interested in measuring first-language (L1) and second-language (L2) vocabulary in children at ages 1, 2, and 3 years, one could go about collecting data in two ways. The first, longitudinal approach, would be to measure vocabulary size in the same group of 20 children over time, testing them at ages 12 months, 24 months, and 36 months. The second, cross-sectional approach, would be to measure vocabulary size of three different groups of children, one group of twenty 12-month-olds, one group of twenty 24-month-olds, and one group of twenty 36-month-olds at about the same point in time. The advantage of longitudinal research is that it follows the same group under different conditions, thereby minimizing between-group differences (such as socioeconomic status, for example) that may influence the findings. Another advantage is that it allows for a smaller sample size of participants and is therefore usually the preferred choice when studying unique groups, such as speakers of an endangered language or bilingual children with Specific Language Impairment (see Kohnert, this volume). The disadvantage of longitudinal research is that it usually has higher attrition rates, with more participants dropping out of the study, moving away, or undergoing a life change that makes it impossible to continue with the experiment. Moreover, longitudinal research can take a long time, making it less than ideal for those researchers who have to work within time constraints, such as undergraduate and graduate students who would like to graduate before their infant participants enter college. The advantages and disadvantages of cross-sectional research are precisely the opposite to those of longitudinal research. On the upside, cross-sectional studies take less time to run and in that way are the more practical choice. On the downside, there are more differences between the various groups of participants, making it difficult to control for extraneous factors.

While some research questions can be answered with either of the two approaches, other hypotheses are better tested with one of these types of research only. In *intervention studies*, the method of choice is usually the longitudinal approach, so that the same group of participants is tested before and after an intervention takes place. Also known as *pre-test/post-test studies*, these studies can focus on a clinical, educational, behavioral, or cognitive intervention. For example, an intervention study with bilinguals may study the effect of language therapy on linguistic performance by having a bilingual child with language impairment take a battery of language tests before and after language therapy. The change in performance as a result of therapy is then examined. Another example is measuring test performance before and after enrollment in a dual-language immersion classroom. In both of these cases, taking a longitudinal approach and comparing performance of the same group before and after treatment is preferable to comparing performance of two different groups.

Finally, it is also possible to combine both approaches, if the research questions warrant doing so and if sufficient resources (time, participants, and money) are available. In the previous language therapy example, the design can be altered from longitudinal to a combined longitudinal and cross-sectional design by testing two groups of bilingual children (with similar language impairments). One group receives language therapy in the first language and the other group receives language therapy in the second language. Pre- and post-intervention measures collected for both groups would allow cross-group comparisons that can elucidate (a) whether language therapy is effective for this particular language disorder in bilinguals, and (b) whether language

therapy in one of the bilinguals' languages is more effective than language therapy in their other language.

Independent Variables, Dependent Variables, and Confounding Variables

In an experiment in which you study how a change in a certain variable influences performance, the variable that is being manipulated is called the *independent variable* and the variable that is being measured is called the *dependent variable*. For example, if you were interested in how language proficiency influences reading speed, you may want to design an experiment in which bilinguals with varying proficiency levels are asked to read text passages. In this case, language proficiency is the independent variable and reading speed is the dependent variable. The same variable can be either an independent variable or a dependent variable, depending on the design of the study. For example, in a study that focuses on the effect of age of acquisition of a second language on proficiency in that language, age of acquisition is the independent variable and language proficiency becomes the dependent variable. In short, the independent variable is always the one that is manipulated and the dependent variable is always the one that involves some type of measurement (e.g., score on a test, percentage of words recalled, number of seconds it takes to complete a task, etc.).

The independent variable is usually varied across groups. That can be accomplished by either having different groups receive different conditions of the independent variable, or by having one group in which the independent variable is being manipulated (called the *experimental group*) and one group in which the independent variable is not being manipulated (called the *control group*). Experimental and control groups should be identical on all variables except the variable of interest, in order to ensure that whatever differences are observed between groups are genuine differences due to the independent variable and not due to other differences between groups or to placebo effects. *Placebo* effects (the term originated from medical studies that found that patients who were given a sugar pill, called a placebo, showed some clinical improvement in medical symptoms similar to those patients who received a real pill containing medication) in bilingualism research can arise from participants simply knowing that they are participating in a research study. Whenever possible, including control groups in your study is a good way to ensure its validity.

In the example considering language therapy for bilingual children with language impairment, performance on a language assessment scale is the dependent variable. The independent variable is language therapy. This independent variable could include multiple conditions, depending upon the design of the study. It could, for instance, have two conditions—treatment and no treatment—in which two groups of bilinguals are tested, one that receives language therapy and one that does not. Using a control group that does not undergo language therapy ensures that passage of time alone, without any treatment, is not responsible for improvements in performance. Or, language therapy could vary across three conditions—treatment in the first language, treatment in the second language, and no treatment—to compare the benefits of treatment in each of a bilingual's languages. Another condition that could be added to this study is a combination of first- and second-language use in treatment. In general, an independent variable can vary across multiple conditions, but, whenever possible, the most efficient and simple design that will answer the target question should be chosen.

In addition to independent and dependent variables, researchers are often faced with confounding variables. *Confounding variables* are variables that the experimenter did not plan to alter in the study design, but that nevertheless influenced participants' performance on the dependent variables

in addition to the stated independent variables. Possible experimental confounds include participant characteristics, such as socioeconomic status, gender, and language proficiency, as well as experimental variables, such as linguistic background of the experimenter, experimental setting, and stimuli selection. For example, participants may switch back-and-forth across languages more if the experimenter is bilingual than if the experimenter is monolingual; therefore, a study that looks at code switches (overt verbal switches between a bilingual's two languages) should take into account the linguistic status of the experimenter. In short, a confound is a third variable that affects the outcome of the experiment.

At the same time, it is not possible to control for every single potentially confounding variable. When designing a study, consider the factors that are most likely to pose a problem for that particular research question and focus on those. A study is at greater risk for invalid and unreliable results if it does not take into account the relevant confounding variables in the design. Consider the example of studies reporting findings that bilinguals in the United States score lower than monolinguals on intelligence tests. Before you run forward with the conclusion that bilingualism is bad for you and that monolinguals are smarter than bilinguals, consider the fact that bilingualism studies from outside the United States, such as the Quebec area of Canada (a bilingual French-English community) have failed to find differences in performance on IQ tests between bilinguals and monolinguals (Pearl & Lambert, 1962). Consider also that the studies reporting lower IQ scores for bilinguals did not take into account socioeconomic factors such as family income and education. That, combined with the facts that the majority of bilinguals in the United States are Hispanic immigrants from Central and South America and that these groups are also frequently of lower socioeconomic status, change the interpretation of that research entirely. Because socioeconomic status is the confounding variable that drove the negative correlation, what it really tells us is that poverty (not bilingualism!) is bad for you and that linguistically diverse groups are disproportionately represented in the lower socioeconomic brackets. Armed with a critical eye and a basic understanding of research, one can easily identify weak experimental designs, poor control over confounding variables, or unwarranted data interpretation. Generally speaking, the outcomes of a study (results and interpretation) are only as good as how the study was conducted (its methods).

Operational Definitions, Reliability, and Validity

For a variable to be valid and reliable, appropriate *operational definition* is necessary. Operational definition refers to the exact measure that is used to assess a particular construct. For example, if an experiment uses vocabulary size as its dependent variable, the operational definition has to indicate whether vocabulary size is defined as production vocabulary or comprehension vocabulary and what assessment tool or scale is used to measure it. One study may operationally define vocabulary size as a child's performance on the Peabody Picture Vocabulary Test (PPVT), a measure of comprehension. A different study may operationally define vocabulary size as all the words a child is producing, as reported by the parent. Of the two operational definitions, the latter would work better for a 13-*month*-old, while the former would work better for a 13-*year*-old. Note, however, that both measures assess the same variable: vocabulary size. Because different studies may use different operational definitions to measure the same dependent variable, it is important to pay careful attention to the operational definitions of both the dependent variables and the independent variables when designing or interpreting a study. In the case of vocabulary, for instance, one may specify that the variable of interest was vocabulary size, defined as comprehension vocabulary,

operationally defined as performance on the PPVT, and measured by administering the PPVT in English by a licensed speech-language pathologist.

Operational definitions are used to define constructs (such as vocabulary, or bilingualism, or creativity, etc.) in ways that are clearly measurable and that refer to observable behaviors, rather than abstract concepts. For example, one may want to study the effects of bilingualism on creativity. But what is creativity? A good operational definition and a way to reliably measure the behavior of choice are necessary in order for the study to be valid. If one defines creativity as the ability to maintain focus on a given task and then operationalizes it as the time one remains awake while reading a scientific paper, the creativity measurements obtained are invalid. The length of time it takes to doze off while reading a paper may be more indicative of the author's writing prowess, the reader's knowledge about and interest in the topic, as well as extraneous variables such as how much sleep the reader got the night before, how much coffee was consumed that day, and whether there will be a test on the material later, rendering this particular measurement of creativity both invalid and unreliable. A better way to test creativity may be to administer the verbal Torrance Test of Creative Thinking or one of the more recent tests designed to measure creativity.

A valid operational definition is one that measures precisely what it set out to measure. *Reliability* refers to the likelihood that the same finding will be obtained if the study is run again, either by the same or by a different researcher. If the construct of creativity *and* the construct of bilingualism are carefully operationally defined, then any researcher who uses the same operational definitions, the same criteria, and the same tools, should be able to replicate the original experiment and obtain the same set of findings.

Note that in the previous example, bilingualism is a construct that requires operational definition, as well. In fact, one of the most critical problems with bilingualism research is the lack of clarity in defining bilinguals and the lack of consistency in classifying different bilingual populations. Many individuals who are new to bilingualism research tend to group everyone who has any number of vocabulary words in another language as "bilingual." As a result, research results often appear contradictory when reporting experimental findings with bilinguals. The bilinguals under study are sometimes foreign language learners who have never used their nonnative language outside the classroom; other times these are fluent, equally balanced bilinguals who use both languages frequently in their everyday life; and yet other times they fall somewhere in-between, perhaps using both languages frequently, yet being more proficient in one than the other. And while attempts to define the different types of bilinguals by age of acquisition and language proficiency are not new (Ervin & Osgood, 1954, 1965; Weinreich, 1974; see also Heredia this volume), a consistent and universally agreed-upon classification of bilinguals is lacking in empirical reports. You may think that it is only a matter of labels, but consider the shortcut and clarity afforded to a researcher studying aphasia (a loss of language resulting from damage to the brain caused by injury or disease) by universally agreed-upon terminology to describe the aphasic population under study. Referring to participants as having "Broca's aphasia" or "Wernicke's aphasia" (for definitions of Broca's and Wernicke's aphasia, see Vaid's chapter on the neuropsychology of bilingualism in this volume) makes many of the characteristics of the population in question evident, including affected areas of the brain and characteristic language deficits. Similarly, using a universal language to describe bilingual populations would increase the reliability and the validity of empirical studies. Until a consensus is reached on which labels to affix to bilingual groups that share certain characteristics, it is best to include any language history variables that describe the group under study when reporting a finding. This way, future replications of the findings are more likely since similar bilingual groups will be targeted for testing. In addition, by knowing what groups have already been tested, it becomes possible to extend

a finding to other groups of bilinguals or second language learners that were not included in the population of the original study.

Between-Group, Within-Group, and Mixed Designs

Between-group (also called between-subject) designs include studies in which the independent variable varies across groups. Whenever more than one group of participants is tested and performance across groups is compared, the design of the study includes a between-group component. For example, whenever bilinguals are compared to monolinguals, or different groups of bilinguals are compared to each other, the design of the study is a between-group design. If there are only two groups tested (say, a bilingual experimental group and a monolingual control group), then the study is said to have one independent variable, group, with two conditions (also called levels), experimental and control. If four groups are tested and compared to each other (say, an English-Japanese group with English as the native language, a Japanese-English group with Japanese as the native language, a monolingual English group, and a monolingual Japanese group) the study is said to follow a between-group design with an independent variable that has four conditions or levels.

Within-group (also called *within-subject*) designs include studies in which the independent variable varies within the same group of participants. *Pre-test/post-test* studies are one example of a within-group design. In within-group studies, performance of a group of participants is compared to performance of the *same group* of participants under different conditions or at different points in time. For example, when the same group of bilinguals is tested in their first language and then tested again in their second language, the design of the study is said to be a within-group design. The number of times a measurement is made determines the number of levels a within-group independent variable has. So, if measurements are made twice, once in the first language and once in the second language, the study is said to follow a within-group design with an independent variable that has two levels. A study can have multiple independent variables at the same time. For example, in addition to first and second language, a study may include treatment status as another within-group independent variable. If a bilingual's performance is measured before, during, and after language therapy, for example, then the study is said to have a within-group design with an independent variable (i.e., treatment) that has three levels. A study that would combine both language (first or second) and treatment (before, during, and after) into the same design is said to have a within-group design with two independent variables. The first independent variable, language, has two levels and the second independent variable, treatment, has three levels. This is reported in scientific journals as a 2-by-3 design (multiply 2×3 and this would give you the number of levels or the number of cells), resulting in six conditions: (a) tested in the first language before treatment, (b) tested in the first language during treatment, (c) tested in the first language after treatment, (d) tested in the second language before treatment, (e) tested in the second language during treatment, and (f) tested in the second language after treatment.

Studies that incorporate both between-group variables and within-group variables are referred to as *mixed-design studies*. Mixed-design studies include independent variables that vary both across the different groups tested, and within each group. For example, if the four groups mentioned earlier (an English-Japanese group with English as the native language, a Japanese-English group with Japanese as the native language, a monolingual English group, and a monolingual Japanese group) were tested each in different conditions (for example, before, during, and after a

language intervention), the study would be described as a 4×3 mixed design, with two independent variables, where the first independent variable is group and is a between-subject variable with four levels, and the second independent variable is treatment and is a within-subject variable with three levels.

Any empirical study in the literature can be classified as between, within, or mixed design. It is not unusual for individuals who are new to research to have difficulties identifying independent and dependent variables, their levels, and the study design. With enough practice reading research papers and designing experiments, this understanding quickly falls into place. Once internalized, the notions make it very easy to understand and process research, so that, for example, if you read a study that describes itself as a 2×2 mixed design with group (bilingual, monolingual) as a between-group variable and condition (picture prime, word prime) as a within-group variable, you can quickly use the learned heuristics to conjure up the specifics of that particular study. Thinking of an experiment in these terms aids both the researcher and the study's audience by facilitating clarity and precision.

Keep in mind that the more complex the design, the more difficult it becomes to control for extraneous confounding factors and interpret the results, making it challenging to conduct well-controlled empirical studies and limiting the reliability and validity of a study. Oftentimes carving a bigger question into its smaller components and designing simple, elegant experiments that test individual predictions is the optimal choice.

How Methodology Can Drive Outcomes in Bilingual Research

The topics of study under the bilingualism umbrella are as diverse and the methodologies as numerous as those with monolinguals and include research in social science, biological science, and humanities. Around the world, scientists are studying bilingualism from developmental, cognitive, linguistic, neurological, psycholinguistic and sociolinguistic perspectives, and are focusing on topics such as cortical organization and neural processing of the two languages in bilinguals, acquisition of two or more languages in bilingual children and second (and subsequent) language learning in adults, lexico-semantic representation and processing, language and memory, language loss/attrition and language interaction, communication disorders in bilinguals, et cetera. In this section, we consider some of the most common difficulties and oversights that those new to bilingualism research face.

Representation and Processing of Languages in Bilinguals

The first thing to underscore when studying representation and processing of the two languages in bilinguals is that the terms *representation* and *processing* are not interchangeable, rather, they refer to different phenomena and should not be confused. Representation refers to the structure and organization of the different language components in bilinguals, while processing refers to activation of these components and their interaction within and between languages. Studies that focus on representation of the two languages usually focus on identifying, locating, and representing the organization of the two languages in the bilingual cognitive architecture. Studies of bilingual language processing usually focus on activation of the two languages (e.g., parallel or sequential), examining variables that influence the levels of activation of each language at each processing level, and the interactions within and between the two languages. For purposes of heuristics, it

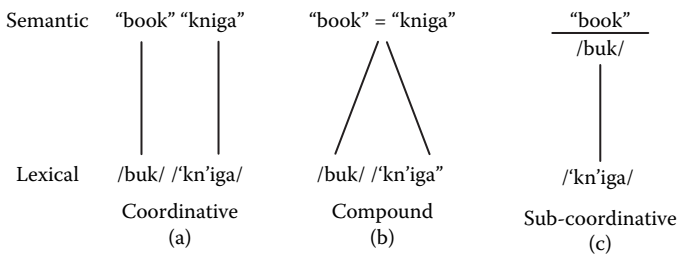

Figure 2.1 Weinreich's classification of bilinguals by mode of acquisition using Russian-English examples (adapted from Weinreich, 1974, pp. 9–19).

may be helpful to think of representation as a static phenomenon and of processing as an active one. The confusion between the two often lies in the fact that the same behavioral measures (e.g., reaction times) can be used to make inferences about both representation and processing. For example, how long it takes a bilingual to retrieve words that are spelled the same way, but carry different meanings in two languages (e.g., *pain*, which in French means *bread*) can be used to infer both how these words are stored in the bilingual lexicon, as well as how they are processed during access. If after seeing the word *pain* English-French bilinguals are faster to recognize the word *bread* in English, this can be interpreted as a result of overlapping representations for pain and bread at the orthographic and possibly lexical (but not semantic) levels. It can also be interpreted as a result of parallel processing in both languages (regardless of whether or not the representations overlap). In general, it takes a relatively sophisticated knowledge of psycholinguistics to be able to clearly delineate between the two when interpreting findings, and even then, much of the thinking is inferential.

Second, when considering language representation and processing, it is important to distinguish between different levels of representation and processing. Higher levels of processing, such as mappings to the semantic level from the lexical level, may differ from lower levels of processing, such as mappings to the lexical level from orthographic/phonetic levels. Consider, for instance, Weinreich's model of lexico-semantic organization in bilinguals (see Figure 2.1, after Weinreich, 1974, pp. 9–10).

Weinreich's discussion is written in terms of *signifieds* (conceptual structure/meaning at the semantic level) and *signifiers* (labels/words at the lexical level) and, according to the Weinrech model, bilinguals' lexico-semantic system can be organized in three ways, depending on how the languages were acquired. Coordinate bilinguals learn the two languages in separate environments and have one *signified* for every *signifier*. Compound bilinguals learn their two languages in the same context concurrently and have only one set of signifieds with two signifiers for each signified. Subcoordinative bilinguals interpret words of their weaker language through the words of their stronger language and the signifier in the first language becomes a signified for the second language. Multiple theories and models have since been proposed to capture the nature of bilingual representation and processing, including such recent theories of language organization and processing in bilinguals as Kroll's (1993; Kroll & de Groot, 1997) Revised Hierarchical Model and de Groot's (1992) Distributed Feature Representation Model, both focused on higher levels of processing in bilinguals. Other models, such as the Bilingual Interaction Activation Model (Dijkstra, van Heuven, and Grainger, 1998) and the Self-Organizing Model of Bilingual Processing (Li & Farkas, 2002) focus more on orthographic and phonological

processing, respectively. Consequently, experimental paradigms that probe different levels of processing can lead to seemingly contradictory results. When designing or interpreting bilingual research, it is important to be aware of the levels of processing that the experiment taps into.

Third, bilingualism is not a static phenomenon, but a dynamic process that undergoes continuous change. As the level of proficiency and/or the manner of acquisition change, so may language processing and representation. Models that adjust representations based on new language experience capture the dynamic nature of bilingualism better than models where representations are pre-set and can not be changed. Moreover, it is possible that within a bilingual person, different representational systems coexist. Some words may be stored coordinatively, others—compoundly, yet others—subordinatively, depending upon the manner in which the words were acquired and/or upon specific characteristics of the words. Individual studies and general theories of bilingual language acquisition, representation, and processing must take into account the complex and fluid nature of the bilingual cognitive architecture when designing and interpreting studies.

Cortical Organization of Languages in Bilinguals

Another area of bilingualism research that frequently yields what appear to be contradictory findings is neurolinguistics. Neurolinguistic research with bilinguals usually focuses on hemispheric organization of the two languages and on location, size, and spread of activation associated with the two languages. The paradigms used include functional Magnetic Resonance Imaging (fMRI), Positron Emission Topography (PET), and ElectroEncephaloGrams (EEG), all of which rely on measuring cortical activity while brain resources are active. For instance, fMRI monitors the brain's use of oxygen from the blood, PET monitors the regional Cerebral Blood Flow and the brain's use of glucose from the blood, and EEGs measure electrical activity in the brain by detecting amount and size of event related potentials. The assumption driving these techniques is that the parts of the brain that use the most resources during a task are those that are most active and involved in performing that task, yielding a functional map of the brain. In addition, cognitive-behavioral studies with bilingual and multilingual individuals with aphasic language loss are used to assess changes in performance as a result of cortical lesion.

The topic that has received the most attention in neurolinguistic research with bilinguals is that of organization of the two languages in the brain, namely whether or not the same cortical areas subserve both languages or whether different areas are associated with each language. On the one hand, many studies have supported the position that the two languages are associated with different cortical structures. For example, selective disruption of first and second language naming has been reported in cortical stimulation studies (e.g., Ojemann & Whitaker, 1978). Selective language loss and/or differential language recovery in multilingual aphasic patients have also been interpreted as evidence for distinct cortical representations for each language (e.g., Gomez-Tortosa, Martin, Gaviria, Charbel, & Ausman, 1995; Nilipour & Ashayeri, 1989; Paradis, 1995; Paradis & Goldblum, 1989). On the other hand, a number of other studies have found evidence for overlapping cortical representations in bilinguals. Overlapping regions of activation in the left inferior frontal gyrus were found in French-English bilinguals using PET (Klein, Milner, Zatorre, Meyer, & Evans, 1995). Chee, Tan, and Thiel (1999) found that late bilinguals activated the same regions for both languages in frontal, temporal, and parietal lobes. And Illes et al. (1999) reported identical frontal lobe activations for both languages in Spanish-English bilinguals. Using functional neuroimaging in studies with bilinguals who acquired their second language post puberty, Kim, Relkin, Lee, and Hirsch (1997) and Marian, Spivey, and Hirsch (2003) found that the two

languages activated separate regions for each language within some cortical areas (e.g., Broca's area in the inferior frontal gyrus, an area known to be particularly active during language production), but not others (e.g., Wernicke's area in the superior temporal gyrus, an area known to be particularly active during language comprehension). This suggests that the two languages of a bilingual may or may not share cortical underpinnings, depending upon the specific task and processing involved, and that the networks of language activation in the brain are overlapping in some areas, but may diverge in others.

It becomes clear, then, that many of the differences in the neurolinguistic literature with bilinguals are due to differences in methodologies and/or participant populations. For example, studies with early bilinguals (bilinguals who acquired both languages in early childhood) have found mostly the same cortical areas activated for both the first and second languages (Chee et al., 1999; Illes et al., 1999; Kim et al., 1997; Perani et al., 1998). Studies with late bilinguals (bilinguals who acquired their second language later in life) produced mixed results, ranging from reports that the two languages are processed similarly (Chee et al., 1999; Illes et al., 1999; Perani et al., 1998) to reports that the two languages are processed differently (Dehaene et al., 1997; Kim et al., 1997). The variability is sometimes accounted for by taking into account language proficiency (Abutelabi, Cappa & Perani, 2001). But even the distinctions in language proficiency and age of acquisition are rather global. In part, the differences in findings are also due to failure to distinguish between distinct activation patterns for different types of information, for example, orthographic, phonological, lexical, and semantic. Studies that focus on monolingual language processing have long been differentiating between different types and modalities of processing (Binder et al., 1994; Fujimaki et al., 1999; Nobre, Allison, & McCarthy 1994; Peterson, Fox, Snyder, & Raichle, 1990; Price & Giraud, 2001; Shaywitz et al., 1995), and similar distinctions should be considered when studying bilingual processing.

In sum, a global first-language versus second-language approach to the neurolinguistics of bilingualism—one that poses the general question of whether the same or different areas in the brain are associated with the first and second languages—is misleading. Bilingual language processing and the associated neural correlates are influenced by the type of processing involved, by the tasks and stimuli used, by experimental methodology, and by participant language history. Moreover, because there is not one area of the brain alone that is devoted to language processing, but rather a network of areas that work together, the question of same or different cortical activation in bilinguals is fundamentally misguided and needs to be reframed in more appropriate terms that reflect the network processing approach.

Language Development in Bilingual Children

Developmental research on bilingualism tends to generate broad public interest. From issues that affect bilingual children directly, such as educational placement of bilingual children, to issues that have the potential to influence the entire population, such as the requirement (or lack of it) of a foreign language in schools, research on bilingual children can impact educators, parents, funding agencies, and government policies. To illustrate the broad range of findings, consider the following two polar-opposite scenarios that happen every day in almost every school district in the United States. Every year thousands of middle-class and upper-class American children take a foreign language for purposes of enrichment. These children, their parents, and teachers function under the assumption that knowing another language "is good for you." At the same time and sometimes in the same school, other children, usually of lower-class and, sometimes, middle-class backgrounds,

usually immigrant, often Hispanic or Asian, are discouraged from and sometimes forbidden to speak a native language, under the assumption that this will prevent them from mastering English and that, in general, raising children with more than one language "will confuse them" and will have long-lasting detrimental effects.

If pressed, both sides can provide what appears to be convincing evidence supporting their position. There are, for instance, studies on the impact of bilingualism on cognitive development that point out that bilingualism in children is associated with increased metacognitive skills and superior divergent thinking ability (a type of cognitive flexibility) and with better performance on some perceptual tasks (such as recognizing a perceptual object "embedded" in a visual background) and classification tasks (for reviews, see Bialystok, 2001; Cummins, 1976; Diaz, 1983, 1985). There are also studies that suggest that bilingualism has a negative impact on language development and is associated with delay in lexical acquisition (e.g., Pearson, Fernandez, & Oller, 1993; Umbel & Oller, 1995) and a smaller vocabulary than that of monolingual children (Verhallen & Schoonen, 1993; Vermeer, 1992). Both arguments are right in a sense, but before going on to discuss the methodological aspects behind such findings, let's digress here to provide assurance that, by all accounts, bilingual children catch up with their monolingual counterparts on tests of verbal ability by the time they are in middle school, and well-controlled studies provide no evidence for lower intellectual abilities of bilingual children compared to monolinguals. The early differences in linguistic performance of bilingual children can be attributed to a language development pattern that is somewhat different from that of a monolingual. Bilingual children learn earlier than their monolingual counterparts that objects and their names are not one and the same, that these are two separate entities, and that one object can have more than one name. But whereas understanding that language is a symbolic reference system is advantageous for metacognitive development, it can be detrimental for early vocabulary assessment.

Consider, for instance, how language assessment usually takes place. If a monolingual child has three lexical labels for three semantic items, say *milk*, *grandma*, and *dog*, and a bilingual child has two lexical labels in English (say *milk* and *grandma*) and two in Spanish (say *leche* and *abuela*, the Spanish words for *milk* and *grandma*), the monolingual child's vocabulary will be counted as consisting of three words and the bilingual child's vocabulary will be counted as consisting of two words. That is because vocabulary size is counted not as the number of lexical items known, but as the number of conceptual representations that have lexical labels. In this way, even though the bilingual child has four words in his/her vocabulary, the lexical labels map onto two conceptual representations only, compared to the three conceptual representations in the monolingual child.

This technique of assessment frequently places bilingual children at a disadvantage. Even worse, sometimes bilinguals are assessed in only one of their two languages, therefore providing an inaccurate assessment of the child's actual level of linguistic and cognitive development. For example, if the bilingual child in the earlier example knew four words in Spanish and four words in English, two of which in each language were translation equivalents, the child should be assessed as having a vocabulary of six words total (two concepts that had labels in Spanish only, two concepts that had labels in English only, and two concepts that had labels in both English and Spanish). Too often, however, children are assessed in only one of their languages, typically the language of the country in which they are being tested (e.g., English, often their second and less proficient language), therefore resulting in assessments that erroneously place the bilingual child at a lower level of vocabulary development than his or her true level. The problem, although clearly disturbing, is not an easy one to fix. Most school districts and speech-language pathology clinics are physically and financially unable to test children in Polish, Romanian, Kirghis, Urdu, Quechua, or any number of languages that may serve as a child's native language. As a result, children may be subject to academic placement below

their appropriate level, handicapping their later academic advancement (for more comprehensive discussions of first/second language knowledge and cognitive processing in bilingual children, see work by Cummins, e.g., Cummins, 1984, ch. 2).

To this day, the majority of clinical and experimental studies focusing on cognitive development in bilingual children assess participants in one language only. However, when "best performance" across the two languages is considered, thus assessing the highest level of cognitive development attained by a bilingual child (as opposed to the level reflected in one language), bilinguals do not appear to be at a disadvantage (e.g., Sheng, McGregor, & Marian, 2007), and in fact may show some advantages. Measures of "best performance" are measures of cognitive development that are not limited by the constraints of one language. For example, in a recent study comparing semantic organization in elementary school-age bilingual Mandarin-English children and monolingual English children, Sheng et al. (2007) compared the number of *syntagmatic* and *paradigmatic* responses in a word association task. Paradigmatic responses (e.g., *dog-pet*, *dog-cat*, *dog-collie*) are indicative of a more mature semantic system organized around category relationships, whereas syntagmatic responses (e.g., *dog-leash*, *dog-bark*) are experience-based and characteristic of a less-developed system (Nelson, 1977). Comparisons among children's performance in the first language, second language and best performances indicated that performance in one language, even when that was the dominant language, was not an accurate reflection of the child's level of semantic development, reinforcing the argument that assessment of bilingual individuals is most accurate when combining best performance across both languages.

Methodological Considerations

Now that the basics of research design and the necessary research vocabulary are in place, the next section will serve as a primer on what variables to consider when studying bilingualism, multilingualism, and second/foreign language learning.

Selection of Languages

Before deciding on the characteristics of the bilinguals to be tested in any given study, a more basic decision to make is what languages the bilingual participants should be speakers of. Aside from obvious practical considerations such as access to a subject pool and ability of the experimenter or research assistant to test in that language, another concern is proper choice of languages from a theoretical standpoint. The answer to some research questions may be directly influenced by the choice of languages that the bilingual group speaks. Languages of the world differ in their auditory qualities, written form, and cross-linguistic similarity. Not only do languages that are closer in a language family tree share origins, but they are also more likely to share vocabulary, phonological qualities, and alphabets.

There are multiple language families (Eskimo-Aleut, Ural-Altaic, Central American, Hamito-Semitic, South American, Dravidian, Basque, Malayo-Polynesian, Sudanese-Guinean, Sino-Tibetan, Bantu, Japanese-Korean, Khoin, Austro-Asian, varying depending on grouping), each consisting of modern languages that share a similar language ancestor. Table 2.1 shows the proximity of some of the languages in the Indo-European language family. Bilingual speakers of two languages that are similar, such as Spanish and Portuguese, for example, or Dutch and Afrikaans, may yield dramatically different results in a study of spoken or written language processing, for

Table 2.1 The Indo-European Language Family Tree. Note That The Components and Organization of a Language Tree May Vary Depending Upon Criteria Applied (adapted from Baldi, 1983; Mallory, 1991).

Proto-Indo-European						
Germanic	Celtic	Italic	Balto-Slavonic	Indo-Iranian		Greek Armenian Albanian Tocharian Anatolian
		Latin		*Sanskrit*	*Iranian*	
German English Frisian Flemish Dutch Afrikaans	Breton Manx Scots Gaelic Irish Gaelic Welsh	Romanian French Portuguese Spanish Italian	Russian Ukranian Belorussian	Punjabi Lahnda Sindhi Pahari Dardic	Ossetic Kurdish Persian Baluchi Tadzhik	
Icelandic Norwegian Swedish Danish Faroese	Goidelic Cornish Brittonic Cumbrian	Catalan Occitan Sardinian Rhaetian	Bulgarian Macedonian Serbo-Croat Slovene	Gujarati Marathi Konkani Maldivian	Pashto	
Gothic	Galatian Gaulish Celtiberian		Polish Czech Slovak Sorbian	Sinhalese Hindi/Urdu Bihari Rajasthani		
			Latvian Lithuanian	Bengali Assamese Oriya		

instance, than speakers of two languages that belong to different branches of the same language family, such as German and Punjabi, or Welsh and Persian. The differences may be even more marked for languages from different language families, such as English and Mandarin, or Russian and Japanese.

Moreover, some questions can only be answered with bilingual speakers of some, but not other, languages. If one were interested in studying how different alphabets influence processing of the same language, for instance, one would have to select a language that can be transcribed using more than one alphabet, such as Serbo-Croatian, which can rely on either the Latin or the Cyrillic alphabets. Some questions can only be answered by studying bilinguals whose two languages share alphabets (such as German-English bilinguals), other questions can only be answered by studying bilinguals whose two languages use different alphabets (such as Korean-English bilinguals), yet other questions can only be answered by studying bilinguals whose two written systems share some, but not all written symbols (such as Russian-English bilinguals). In studies of bilingual reading, for example, taking into account ease of grapheme-to-phoneme mapping is particularly important, because languages with shallow orthographies (consistent letter-to-sound mapping, like Spanish) are processed differently in some aspects than languages with deep orthographies (inconsistent letter-to-sound mapping, like English). When selecting the languages for a study, understanding the constraints that each language places on the research at hand and taking these constraints into account when interpreting findings is essential.

Selection of Participants

In general, research in psychology, communication sciences and disorders, education, and linguistics is not representative of individuals with a diverse linguistic and cultural background, despite the fact that, when the world as a whole is considered, bilingualism is the norm, rather than the exception (Grosjean, 1992; Harris & McGhee-Nelson, 1992; Romaine, 1995; de Groot & Kroll, 1997) and that the proportion of bilinguals in the United States is rapidly growing (Daw, 2002). It is estimated that there are about 30 times as many languages in the world as there are countries and that at least half of the world population is bilingual (Romaine, 1995). In the United States, the results of the 2000 Census indicate that, due to changes in ethnic, linguistic, and racial composition, the minority population (Spanish-speaking, in particular) is growing 12 times faster than the majority population and that the foreign-born population grew from 19.8 million to 30.5 million between 1990 and 2000. By the year 2000, 18% of American households spoke a language other than English at home, a proportion that is steadily increasing. And yet, the vast majority of experimental populations under study are monolingual. Linguistically diverse populations remain severely understudied, underserved, and underrepresented.

We have already mentioned that selection of target languages can influence the outcomes of a study and may lead to apparently contradictory results. But even in speakers of the same languages, a number of variables other than the language per se can influence research outcomes. For example, factors such as *age of acquisition* may influence cortical organization of a bilingual's two languages, with bilinguals who learned both languages in parallel from early in life showing more overlap in cortical areas associated with first and second language activation, compared to bilinguals who learned a second language later in life (e.g., Kim et al., 1997). *Manner of acquisition* is another factor that has been found to influence results of bilingualism studies, with bilinguals who learned their second language by rote memorization of translation equivalents in a classroom setting showing a lexico-semantic organization consistent with the Word Association Model (in

which the meaning of a word in L2 is accessed via its translation equivalent in L1), while bilinguals who learned their second language via everyday use in a second-language-speaking environment showing a lexico-semantic organization consistent with the Concept Mediation Model (in which access to word meaning is by direct route from lexical label to concept in both the first and second languages; Potter, So, Eckardt, & Feldman, 1984). Moreover, the actual conceptual representation of a word is more likely to differ in these two groups of bilinguals. Conceptual representations are more likely to be shared across languages for bilinguals who learned their second language in a classroom setting via translation of L1 lexical labels. Conceptual representations are less likely to overlap across languages for bilinguals who learned both languages via regular use in everyday environments (de Groot, 1992).

In addition to age of acquisition and manner of acquisition, another crucially important factor to consider is *proficiency*. How well do these bilinguals know their first and second languages? How well can they speak, understand, read, and write in their two languages? In addition to absolute proficiency in each of the two languages, what is the *relative* proficiency of one language with respect to the other—are these *balanced* bilinguals or is one language stronger than the other? In balanced and nonbalanced bilinguals, relative activation of the two languages may differ, thus leading to different results in studies that compare activation and interference of the two languages in bilingual language processing. Relative activation of the two languages is likely to also be influenced by current use of and recent exposure to the two languages. Language background questionnaires, such as the Language Experience and Proficiency Questionnaire (LEAP-Q, Marian, Blumenfeld, & Kaushanskaya, 2007), are usually used to assess bilinguals self-reported history of acquisition and use of the two languages.

Psycholinguistic studies with bilinguals may require the researcher to also control for differences on such variables as working memory capacity, vocabulary size, verbal/nonverbal IQ scores, and/or other cognitive attributes as relevant to a particular experiment. Sociolinguistic studies with bilinguals may require the researcher to control for such differences as socioeconomic status, level of education, gender, or birth order. When more than one group of participants is tested, control for potentially problematic confounding variables can be accomplished by matching participants in the two groups on relevant variables (e.g., nonverbal IQ scores) or by random assignment of participants to groups.

Selection of Tasks and Stimuli

There are a number of classic tasks in bilingualism research that have been shown to be valid and reliable measures of cognitive performance in bilingual studies. For example, picture naming, word translation, word recognition, passage reading, cross-linguistic priming, Stroop tasks, and more recently eye-tracking have all been used to study bilingual language representation and processing. Variations on classic monolingual tasks are frequently used. For example, priming tasks are frequently used with monolinguals to study lexical and semantic activation. A simple example would be presenting a participant with the prime *dog* and examining speed of recognition in a lexical decision task (is this a word or a nonword?) for targets such as *cat* and *cloud*. Because *cat* is semantically related to *dog*, it is usually recognized faster than *cloud*, a semantically unrelated item. In bilinguals, priming tasks are frequently used to establish whether semantic representations are shared between languages. For example, in a Spanish-English bilingual, would the prime *dog* activate the target *gato* (Spanish for *cat*) in the same way that it activates the target *cat* and/or in the same way that the prime *perro* (Spanish word for *dog*) does? Similarities and differences in priming

across languages and within languages provide insights into the extent to which the two semantic networks are integrated in a bilingual. Variations in the priming paradigm include presenting bilinguals with a prime that is either in the visual modality and can be a written word, a syllable, a letter, a symbol, a feature such as a line, etc., or in the auditory modality and can be a spoken word, syllable, phoneme, linguistic or nonlinguistic sound such as tone or music. Similarly, the target can also vary within and across modalities, languages, and levels of processing that it taps into.

New tasks and methodologies are continually emerging. These, coupled with novel approaches or technologies, make it possible to study questions that were previously impossible to answer. For instance, in studies of bilingual spoken language processing, it has proved difficult to reliably measure activation of a nontarget language without overtly using that language in a task. Recent developments in eye-tracking methodology make it possible to use bilinguals' eye movements as an index of language activation. For instance, showing that Russian-English bilinguals make eye movements to a *stamp* when instructed in English to pick up a *marker* (because the Russian word for *stamp* is *marka*), suggests that bilinguals do not deactivate the nontarget language during comprehension and thus supports a parallel-processing approach to bilingual spoken language comprehension (Marian & Spivey, 2003; Spivey & Marian, 1999). Activation of a language that is not overtly used is tested behaviorally by recording bilinguals' eye movements to objects whose names in the nontarget language overlap with names of other objects in the target language. This use of eye-tracking technology to study nontarget language activation in bilinguals provides the strongest support to date for parallel activation of both languages in bilingual spoken language processing. Of course, it is not the task's novelty that is important, but its ability to validly and reliably answer the questions at hand.

Virtually every task used to study monolinguals and virtually every approach in cognitive, behavioral, and neural sciences can be successfully applied with bilingual populations. Methodologies such as functional Magnetic Resonance Imaging, Positron Emission Tomography, or Evoked Response Potentials have all been successfully used with bilinguals. Challenges arise not because different tasks are used, but because the different tasks often probe different phenomena, and that is not always taken into account when interpreting the findings. For instance, a priming paradigm can be used to study phonological, lexical, or semantic processing and can show facilitation in one case and inhibition in another, underscoring the need to take into account the tasks that were used and the types of processing that were tapped into when obtaining a particular result.

In addition, careful consideration should be given to all stimulus characteristics that may bear on the outcome of the study. For example, most experiments with bilingual participants use linguistic stimuli, such as sentences, words, and phonemes. If the stimuli are words, for instance, factors such as word frequencies in the two languages may influence the outcome. Regardless of what languages or bilingual populations are used, high-frequency words are likely to be recognized faster than low-frequency words, and this effect may influence the results. This general finding in the psycholinguistic literature is known as *the word frequency effect*. In addition to considering frequencies within a language, as is normally done in monolingual research, bilingualism research must also control for word frequencies *across* languages, to ensure that word frequency differences across languages are not driving the effects. Even when the actual stimuli used are not words, for example, when pictures are used, the label of the picture may continue to be important and factors such as word frequencies for the labels that the pictures represent should still be taken into account. Further, variables such as bigram frequency (the likelihood of two graphemes co-occurring together in a language) or consistency of letter-to-sound mappings in stimuli can also play a role, depending upon the question under investigation.

Running the Experiment

Before a researcher can begin running a study and collecting actual data, any research project with human participants must be approved by an Institutional Review Board (IRB) and all researchers must undergo training to comply with the Health Insurance Portability and Accountability Act. When testing participants, it is important to follow ethical guidelines and considerations, protecting participants' rights to privacy and confidentiality. Participants must provide informed consent and care should be taken so that no physical or psychological harm is inflicted upon them. When testing bilinguals, consideration should be given to which of the two languages should be used when obtaining informed consent.

Actual data collection can take place in many ways, including face-to-face format, computer-collected format, paper-and-pencil format, recordings of brain activity, etc. During experimental procedures, the guidelines set for language use throughout the experiment should be consistent with the purposes of the study. In some studies, language switches may be discouraged or even prohibited, while in other studies they may be acceptable or even encouraged. When analyzing data, one may work with videotaped or audiotaped recordings, written transcriptions, or digital files. In many cases, the raw data need to be transcribed and coded first. When transcribing and coding data, it is important to ensure that a coder is consistent within her/his own coding from time A to time B and that multiple coders are consistent across each other.

When testing a research hypothesis, most studies will rely on statistical analyses to ensure that their effects did not emerge by chance and are reliable (i.e., statistically significant). Statistical significance refers to the likelihood of a particular set of results to have happened by chance. For example, when reporting analyses that have a probability level less than 0.05 (reported as $p < 0.05$), what the researcher is saying is that the likelihood of those results to have happened by chance is less than 5 in 100. In behavioral research, probability levels of 0.05 and 0.01 (1 in 100) are typically used, while in medical research, more stringent criteria are usually used, with probability levels of 0.001 (1 in 1,000) and 0.005 (5 in a 1,000) more common. In addition or instead of significance testing, many of the more recent studies in the scientific literature have adopted the use of confidence intervals. A confidence interval assesses the probability that a parameter lies within a particular range of values. In other words, it provides a range of probabilities within which the true probability would lay 95% or 90% of the time, depending on the precision desired. It also provides a way of determining whether the sample is large enough to make the trial definitive. A narrow confidence interval implies high precision, making it possible to specify plausible values to a small range. A wide interval implies poor precision, making it possible to only specify plausible values to a broad and uninformative range. For strong data analysis skills, there is no substitution for a good statistics course and good statistical analysis resources, such as software and textbooks.

Summary and Conclusion: The Journey to Scientific Paper

If you've ever stayed up all night reading a book because you couldn't wait to find out how it ended, or if you've ever been excited by the prospect of discovering or learning something new, your intellectual curiosity may make you a prime candidate for a research career, one marked by many hours at the library, in the lab, in front of the computer, and in the classroom. But there is a long road from that initial intellectual curiosity to a completed scientific project. And although the exact quest will differ in its content, with questions asked and specific studies varying widely,

the path from the original idea to a shared scientific truth is very similar, at least for those working with bilinguals. It includes familiarizing oneself with the literature, defining a research question, considering relevant variables, running the experiment, analyzing data, and reporting the results. Once the data are collected and analyzed, the researcher approaches the end of the journey, when it's time to sit down and write up a report of the findings. You may think that the stack of papers reporting the outcomes of statistical analyses symbolizes the grand finale, but no research project is truly complete until its findings are written up and disseminated among the community of scholars working in that area. And whether it is a course term paper, a doctoral dissertation, a conference paper, or a journal article, writing up the research project and transforming it into a scientific paper is for many the most challenging part of the research journey. Writing can be a difficult process; it requires discipline and organization. It is also the process that reveals any weaknesses of ideas and execution that may not have been apparent at the start of the project (a good reason to write research proposals early on). Many students have a difficult time at the writing stage because they expect perfection and are anxious about producing anything less than that, or because they feel overwhelmed by the scope of the task. Others will say that, once they know the results of the study, once they know "how it all turns out," they are no longer interested in the project. Whatever the reason, absence of a written report makes it difficult for findings to reach an audience, and without shared scientific knowledge, a project that has not been written up is about as good as one that has never been run.

If you find that the writing stage does not come as easily as you would have liked, try to come up with a few things that can help you accomplish your goals of a well-written, fine research paper. Figure out what works best for you as far as effective approaches to writing. Though the techniques that are successful vary from person to person, there are a couple of things that seem to work consistently. One is perseverance: not giving up, staying on course, working on the project until it is completed. You may write more on some days, less on others, but be sure to write consistently. Set goals that are not overwhelming to start with. If it's going well, keep at it; if you are not particularly productive on a given day, work on the "busy work," things that take time and effort but do not require as much thought. Another thing that many find helpful in early stages of a writing career is having someone to turn to for support. This may be a mentor, an adviser, a significant other, a parent, a student, a colleague, a friend, a former teacher, a therapist, a writing coach—anyone who is there for you when you need a word of encouragement and support. Eventually, as you become a more experienced writer and internalize the techniques that work for you and learn the ebb and flow of your particular writing style, you may no longer need a touchstone person to turn to, but in those early days, seeking out an environment that is supportive and encouraging may make the difference between a completed undergraduate honors thesis and graduating without distinction, or between a doctorate dissertation and an eternal ABD (all-but-dissertation). Finding out what and who motivates you to be a better writer and researcher can open the door to a successful research career for many years to come. And, as you benefit from the support and encouragement of others, remember to be that supportive and encouraging person to someone else in turn.

You will most likely go through numerous drafts before the final paper is published in a peer-review scientific journal. The first completed draft will be revised and polished many times before it is ready to be submitted to a journal or turned in to your advising committee. And the work does not end there. Members of advising committees often require revisions. Scientific journals follow a peer-review process and also, more often than not, require revisions. It is not unusual for an author to have to go through more than one round of revisions. Ultimately, the goal of that process is to produce an informative, well-written, high-impact study, expanding scientific horizons. Hopefully, this introductory overview of bilingual research methods can serve as a stepping-stone

to understanding and conducting research on the human linguistic capacity and on the ability to accommodate more than one language simultaneously.

List of Key Words and Concepts

Age of acquisition, Balanced bilinguals, Between-group design, Confounding variable, Correlational studies, Compound bilingualism, Coordinate bilingualism, Cortical organization of language, Cross-sectional, Descriptive studies, Early bilinguals, Experimental studies, Independent variable, Language development in bilingual children, Late bilinguals, Lexical, Longitudinal design, Manner of acquisition, Mixed design, Operational definition, Orthographic, Phonological, Proficiency, Reliability, Representation and processing of language, Semantic, Unbalanced bilinguals, Validity, Within-group design, Word frequency effect

Internet Sites Related to Bilingual Research

Bilingualism Database: http://www.education.bham.ac.uk/webapps/bilingualism/search.php
Linguistic Society of America: http://www.lsadc.org/
National Clearing House for English Language Acquisition and Language Instruction Educational Programs: http://www.ncela.gwu.edu/
Bilingualism and Psycholinguistics Laboratory at Northwestern University: http://www.communication.northwestern.edu/csd/research/bilingualism/Viorica_Marian/

Discussion Questions

For the experimental examples included in the observational and experimental studies section to the between- and within-group and mixed design section (pp. 27–40).

1. Identify the design, the independent variables and the dependent variables.
2. When conducting these studies, what confounds would you attempt to avoid and how?
3. How may the outcome of these studies vary between bilinguals who are highly proficient in both languages and bilinguals with different proficiency levels in the two languages?
4. Choose two of the examples used in the text and answer Review questions 1 to 3 for those sample experiments.

Suggested Research Projects

1. *Experimental Study: The Stroop Effect with Bilinguals and Monolinguals.*
   Write color words using different color ink; for example, write the word *black* in either black or red ink. For half of the words the color of the ink and the color word should match, for the other half the color of the ink should be different from the color spelled by the word. Now ask your classmates to name the color of the ink for each word, ignoring the words themselves. Time the responses. Compare response times for items in which the color of the ink and the word match to items where the two do not match. How do you explain the results? Now

ask those classmates who speak more than one language to name the color of the ink in the other language they know (not the language that the words are written in). Again, time their responses. Compare response times for trials in which the language used to name pictures is the same as the language of the written words to trials in which the language used to name pictures is different from the language of the written words. How do you explain these results? Did it make a difference whether the bilingual subjects were speaking their first or second language? Their stronger or weaker language? For more about the bilingual Stroop task, read Preston and Lambert (1969) and Tzelgov, Henik, & Leisner (1990), and please visit: http://www.pbs.org/wgbh/nova/everest/exposure/stroopintro.html http://www.apa.org/science/stroop.html

2. *Observational Study: Bilingual Narrative Analysis.*
   Interview a bilingual speaker about a salient childhood event (e.g., a memorable birthday, a visit to the doctor, a move, a vacation trip, etc.) in each of the two languages s/he speaks (if you are not bilingual yourself, ask a bilingual classmate to conduct the interview). Tape the narratives. Does the bilingual switch to the other language during a narrative? Do the switches appear random or do they occur in a systematic fashion (e.g., at the same point in a sentence, or related to the same topic, or in one language more than in the other)? How do you explain these results? Are there other differences across the two languages (e.g., emotional content and intensity, self-construal)?

Suggested Readings

American Psychological Association. (2001). *Publication Manual of the American Psychological Association* (5th ed.). Washinton, DC: APA.

Baker, C., & Prys Jones, S. P. (1998). *Encyclopedia of bilingualism and bilingual education.* Clevedon, England: Multilingual Matters.

Grosjean, F. (1998). Studying bilinguals: Methodological and conceptual issues. *Bilingualism: Language and Cognition, 1*, 131–149.

Ray, W. J. (1993). *Methods: Towards a science of behavior and experience.* Pacific Grove, CA: Brooks/Cole.

Weinreich, U. (1966). *Languages in Contact: Findings and problems.* The Hauge-Paris: Mouton.

Author Notes

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References

Abutalebi, J., Cappa, S.F., & Perani, D. (2001). The bilingual brain as revealed by functional neuroimaging. *Bilingualism: Language and Cognition, 4*, 179–190.

Baldi, P. (1983). *An introduction to the Indo-European languages.* Carbondale, IL: Southern Illinois University Press.

Ben-Zeev, S. (1977). The influence of bilingualism on cognitive strategy and cognitive development. *Child Development, 48*, 1009–1018.

Bialystok, E. (2001). *Bilingualism in development: Language, literacy, and cognition.* New York: Cambridge University Press.

Binder, J. R., Rao, S. M., Hammeke, T. A., Yetkin, F. Z., Jesmanowicz, A., Bandertini, T. A., Wong, E. C., Estkowski, L. D., Goldstein, M. D., Haughton, V. M., & Hyde, J. S. (1994). Functional magnetic resonance imaging of human auditory cortex. *Annals of Neurology, 35*, 662–672.

Brigham, C. C. (1923). *A study of American intelligence.* Princeton, NJ: Princeton University Press.

Chee, M. W. L., Tan, E. W. L., & Thiel, T. (1999). Mandarin and English single word processing studied with functional magnetic resonance imaging. *Journal of Neuroscience, 19,* 3050–3056.

Cummins, J. (1976). The influence of bilingualism on cognitive growth: A synthesis of research findings and explanatory hypotheses. *Working Papers on Bilingualism, 9*, 1–43.

Cummins, J. (1984). *Bilingualism and special education: Issues in assessment and pedagogy*. San Diego, CA: College-Hill Press.

de Groot, A. M. B. (1992). Bilingual lexical representation: A closer look at conceptual representations. In R. Frost & L. Katz (Eds.), *Orthography, phonology, morphology, and meaning* (pp. 389–412). Amsterdam: Elsevier.

Dehaene, S., Dupoux, E., Mehler, J., Cohen, L., Paulesu, E., Perani, D., et al. (1997). Anatomical variability in the cortical representation of first and second language. *Neuroreport, 8*(17), 3809–3815.

Diaz, R. M. (1983). The impact of bilingualism on cognitive development. In E. W. Gordon (Ed.), *Review of research in education* (Vol. 10, pp. 23–54). Washington, DC: American Educational Research Association.

Diaz, R. M. (1985). Bilingual cognitive development: Addressing three gaps in current research. *Child Development, 56*, 1376–1388.

Dijkstra, A., van Heuven, W. J. B., & Grainger, J. (1998). Simulating cross-language competition with the bilingual interactive activation model. *Psychologica Belgica*, *38*, 177–196.

Ervin, S. M., & Osgood, C. E. (1954). Second language learning and bilingualism. *Journal of Abnormal and Social Psychology 49/Supplement*, 139–146.

Ervin, S. M., & Osgood, C. E. (1965). Second language learning and bilingualism. In C. Osgood & T. Sebeok (Eds.). *Psycholinguistics: A survey of theory and research problems with a survey of psycholinguistic research* (pp. 139–146). Bloomington, IN: Indiana University Press.

Fujimaki, N., Miyauchi, S., Puetz, B., Sasaki, Y., Takino, R., Saakai, K., & Takada, T. (1999). Functional magnetic resonance imaging of neural activity related to orthographic, phonological and lexicosemantic judgments of visually presented characters and words. *Human Brain Mapping, 8*, 44–59.

Goddard, H. H. (1914). *Feeble-mindedness. Its causes and consequences.* New York: Macmillan.

Gomez-Tortosa, E., Martin, E. M., Gaviria, M., Charbel, F., & Ausman, J. I. (1995). Selective deficit of one language in a bilingual patient following surgery in the left perisylvian area. *Brain and Language, 48*, 320–325.

Goodenough, F. (1926). Racial differences in the intelligence of school children. *Journal of Experimental Psychology, 9*, 388–397.

Grosjean, F. (1992). Another view of bilingualism. In Harris, R. (Ed.). *Cognitive Processing in Bilinguals* (pp. 51–62). Amsterdam: North-Holland.

Grosjean, F. (1997). Processing mixed language: Issues, findings, and models. In A. de Groot & J. Kroll (Eds.), *Tutorials in bilingualism: Psycholinguistic perspectives* (pp. 225–254). Hillsdale, NJ: Lawrence Erlbaum Associates.

Grosjean, F. (1998). Studying bilinguals: Methodological and conceptual issues. *Bilingualism: Language and Cognition, 1*, 131–149.

Harris, R., & McGhee-Nelson, E. M. (1992). Bilingualism: Not the exception any more. In Harris, R. (Ed.). *Cognitive Processing in Bilinguals* (pp. 3–14). Amsterdam: North-Holland.

Herrnstein, R. J., & Murray, C. (1994). *The bell curve.* New York: Simon & Schuster.

Illes, J., Francis, W. S., Desmond, J. E., Gabrieli, J. D. E., Glover, G. H., Poldrack, R., Lee, C. J., Wagner, A. D. (1999). Convergent cortical representation of semantic processing in bilinguals. *Brain and Language, 70*, 347–363.

Kim, K. H. S., Relkin, N. R., Lee, K. M., & Hirsch, J. (1997). Distinct cortical areas associated with native and second languages. *Nature, 388*, 171–174.

Klein, D., Milner, B., Zatorre, R., Meyer, E., & Evans, A. (1995). The neural substrates underlying word generation: A bilingual functional-imaging study. *Proceedings of the National Academy of Science, USA, 92*, 2899–2903.

Kroll, J. F. (1993). Accessing conceptual representations for words in a second language. In R. Schreuder and B. Weltens (Eds.), *The Bilingual Lexicon* (pp. 53–82). Amsterdam: John Benjamins.

Kroll, J. F., & de Groot, A. M. B. (1997). Lexical and conceptual memory in the bilingual: Mapping form to meaning in two languages. In A. M. B. de Groot & J. F. Kroll (Eds.), *Tutorials in bilingualism: Psycholinguistic perspectives* (pp. 169–199). Mahwah, NJ: Lawrence Erlbaum Associates.

Li, P., & Farkas, I. (2002). A self-organized connectionist model of bilingual processing. In R. Heredia & J. Altarriba (Eds.), *Bilingual sentence processing* (pp. 59–85). North Holland: Elsevier Science Publisher.

Mallory, J. P. (1991). *In search of the Indo-Europeans: Language, archaeology, and myth.* New York: Thames and Hudson.

Marian, V., Blumenfeld, H., & Kaushanskaya, M. (2007). The Language Experience and Proficiency Questionnaire (LEAP-Q): Assessing language profiles in bilinguals and multilinguals. *Journal of Speech, Language, and Hearing Research, 50, 4*, 1–28.

Marian, V., & Spivey, M. (2003a). Competing activation in bilingual language processing: Within- and between-language competition. *Bilingualism: Language and Cognition, 6,* 1–19.

Marian, V., & Spivey, M. (2003b). Comparing bilingual and monolingual processing of competing lexical items. *Applied Psycholinguistics, 24*(2), 173–193.

Marian, V., Spivey, M., & Hirsch, J. (2003). Shared and separate systems in bilingual language processing: Converging evidence from eyetracking and brain imaging. *Brain and Language, 86*, 70–82.

Nelson, K. (1977). The syntagmatic-paradigmatic shift revisited: A review of research and theory. *Psychological Bulletin, 84*, 93–116.

Nilipour, R., & Ashayeri, H. (1989). Alternating antagonism between two languages with successive recovery of a third in a trilingual aphasic patient. *Brain and Language, 36,* 23–48.

Nobre, A. C., Allison, T., & McCarthy, G. (1994). Word recognition in the human inferior temporal lobe. *Nature, 372*, 260–263.

Ojemann, G. A., & Whitaker, H. A. (1978). The bilingual brain. *Archives of Neurology, 35,* 409–412.

Paradis, M. (Ed.). (1995). *Aspects of bilingual aphasia*. Oxford, UK: Tarrytown.

Paradis, M., & Goldblum, M. C. (1989). Selective crossed aphasia in a trilingual aphasic patient followed by reciprocal antagonism. *Brain and Language, 36*, 62–75.

Pearl, E., & Lambert, W. E. (1962). Relation of bilingualism to intelligence. *Psychological Monographs, 76*, 1–23.

Pearson, B. Z., Fernandez, S. C., & Oller, D. K. (1993). Lexical development in bilingual infants and toddlers: Comparison to monolingual norms. *Language Learning, 43*, 93–120.

Perani, D., Paulesu, E., Galles, N. S., Dupoux, E., Dehaene, S., Bettinardi, V., Cappa, S. F., Fazio, F., & Mehler, J. (1998). The bilingual brain: Proficiency and age of acquisition of the second language. *Brain, 121*, 1841–1852.

Petersen, S. E., Fox, P. T., Snyder, A. Z., & Raichle, M. E. (1990). Activation of extrastriate and frontal cortical areas by visual words and word-like stimuli. *Science, 249,* 1041–104

Potter, M. C., So, K., Eckardt, V., & Feldman, L. (1984). Lexical and conceptual representation in beginning and proficient bilinguals. *Journal of Verbal Learning and Verbal Behavior, 23*, 23–38.

Preston, M., & Lambert, W. (1969). Interlingual interference in a bilingual version of the Stroop color-word task. *Journal of Verbal Learning and Verbal Behavior, 8*, 295–301.

Price, C., & Giraud, A. L. (2001). The constraints functional neuroimaging places on classical models of auditory word processing. *Journal of Cognitive Neuroscience, 13,* 754–765.

Romaine, S. (1995). *Bilingualism*, Oxford, U. K: Blackwell.

Sarfarazi, M., & Sedgwick, E. M. (1996). Event related potentials (ERP) as a function of language processing in bilinguals. *Electroencephalography Clinical Neurophysiology, 99,* 347.

Shaywitz, B. A., Pugh, K. R., Constable, R. T., Shaywitz, S. E., Bronen, R. T., Fulbright, R. K., Shankweiler, D. P., Katz, L., Fletcher, J. M., & Skudlardki, P. (1995). Localization of semantic processing using functional magnetic resonance imaging. *Human Brain Mapping, 2,* 149–158.

Sheng, L., McGregor, K., & Marian, V. (2007). Lexical-semantic organization in bilingual children: Evidence from a repeated word association task. *Journal of Speech, Language, and Hearing Research, 49, 3*, 572–587.

Spivey, M., & Marian, V. (1999). Cross talk between native and second languages: Partial activation of an irrelevant lexicon. *Psychological Science*, *10,* 281–284.

Tzelgov, J., Henik, A., & Leisner, D. (1990). Controlling stroop interference: Evidence from a bilingual task. *Journal of Experimental Psychology, 16,* 760–771.

Umbel, V. M., & Oller, D. K. (1995). Developmental changes in receptive vocabulary in Hispanic bilingual school children. In B. Harley (Ed.), *Lexical issues in language learning* (pp. 59–80). Amsterdam: John Benjamins.

Verhallen, M., & Schoonen, R. (1993). Lexical knowledge of monolingual and bilingual children. *Applied Linguistics 14*(4), 344–363.

Vermeer, A. (2001). Breadth and depth of vocabulary in relation to L1/L2 acquisition and frequency of input. *Applied Psycholinguistics, 22*, 217–234.

Weinreich, U. (1974). *Languages in contact: Findings and problems.* Paris: Mouton.

Chapter 3

Mental Models of Bilingual Memory

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Introduction

As a way to introduce this chapter, consider sentences 1a–b uttered by a Spanish-English bilingual child.

(1a) Papi quelo bailal (Translation: Daddy I want to dance)
(1b) Yo quelo candy (Translation: I want candy)

Besides the obvious phonological variants of the Spanish verb conjugations (e.g., *quelo* for *quiero* and *bailal* for *bailar*), these sentences illustrate the bilingual's ability to function in a monolingual (sentence 1a) or a bilingual (sentence 1b) language mode. This ability of bilinguals to function independently in one language or in both languages simultaneously has lead bilingual researchers to wonder about how bilinguals might represent their two languages in memory. The purpose of this chapter is to provide an overview of some of the most influential and current theories in the study of bilingual memory representation. The discussion starts by providing a general overview of the different types of memories that have been identified in the cognitive literature, followed by an evaluation of the one- versus two-memory hypotheses, as well as the view that proposes a bilingual memory representation based on how the bilingual's languages were learned. Next, models that assume a memory structure composed of language-specific mental lexicons or dictionaries and a shared general memory store are evaluated. We then go on to discuss bilingual models that focus primarily on the different types of words (e.g., abstract vs. concrete), and how these words interact across the bilingual's two languages. The chapter concludes with a brief introduction to

the *bilingual interactive activation model* (BIA) that assumes activation of multiple levels during bilingual word recognition.

Memory or Multiple Memories

The issue of bilingual memory storage has been the primary focus of bilingual research for the past three decades. Bilingual research has sought to discover the manner in which the bilingual's two languages are recorded or stored under the assumption that a record of memories must be kept in some type of memory store or structure. As an analogy, a memory structure could be thought of as a computer hard drive where information is stored. However, the issue of memory storage is a complex one because memory researchers have identified many different types of memories that serve highly specialized purposes (cf. Roediger, 1991). That is, the human memory system is not a unitary system, and it would be difficult to talk about memory or memories without specifying the particular type of memory that is being addressed. For this reason, the following discussion is intended to provide a brief general overview of the different types of memories hypothesized in memory research.

Figure 3.1 shows a possible theoretical human memory structure. This model underscores the traditional distinction between short-term (STM) and long-term memory (LTM). STM is the temporary memory store where incoming and ongoing information is being processed before being lost or transferred to LTM. LTM, on the other hand, is the permanent memory store that contains all of the information an individual knows about the world in general. Unlike the LTM whose capacity is conceived as unlimited, STM's capacity is very limited. However, it is important to point out that the theoretical concept of STM has slowly been replaced by the current popular view of working memory (see Repovš & Baddeley, 2006 for a thorough discussion of working memory). Hence, for brevity and to remain faithful to the traditional memory model as proposed by Atkinson and Shiffrin (1968), STM is maintained here. Nevertheless, it should

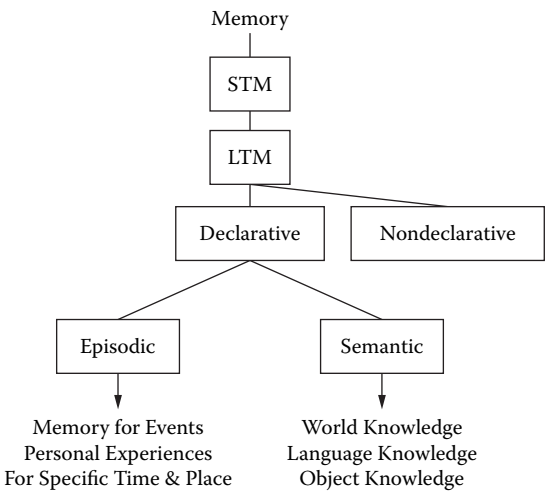

Figure 3.1 A possible structure of the human memory system (adapted from Atkinson & Shiffrin, 1968; and Roediger, 1991).

be acknowledged that the distinction between STM and LTM is not as clear cut as suggested in this discussion. In fact, some researchers are still not convinced that STM and LTM are different memories (see for example, Matlin, 2005). Also, it should be noted that STM and LTM are interactive in the sense that information stored in LTM could be accessed by STM as needed.

Figure 3.1 shows the complexity of LTM. For example, this memory store is subdivided into various highly specialized subsystems or submemories. In general, *declarative memory* is typically described as the store involved in knowing factual information or knowing the "that" about information. This store is further divided into two highly specialized memories. *Episodic memory* is involved with specific time-related memory for events and personal experiences. For some of us, 9/11 was an event that had so much impact on our lives that it has become part of our personal memories or episodic memory. This is why we are able to remember specific details about this event. However, 911 is also part of our world knowledge or *semantic memory*. In other words, 911 also represents the telephone number that must be dialed for an emergency. Information about world knowledge or encyclopedic knowledge is maintained in semantic memory. *Nondeclarative* or *procedural memory*, on the other hand, is concerned with information about "how" to do things. This memory is directly involved with our knowledge concerning how to ride a bicycle or how to type on a keyboard, for example. How do bilinguals organize their two languages within this rich and complex memory system? The next section proposes two alternatives to the issue of bilingual memory storage. For the present purposes and in reference to the memory model described in Figure 3.1, the focus of the following discussions is on semantic memory. Thus, the following hypotheses describe the possibility that bilinguals might posses one or two semantic memories.

Bilingual Memory: One or Two Memory Systems

Two hypotheses have dominated the field of bilingual memory. The *shared* or *interdependence memory hypothesis* proposed a bilingual structure in which the bilingual's two languages were organized in one memory store. Accordingly, words from the bilingual's two languages were stored in memory in the form of language-free concepts (or abstractions) with a single meaning underlying both words or labels (e.g., Caramazza & Brones, 1980). Put differently, this model basically posits that for translation equivalents such as *house* in English and *casa* in Spanish only their meaning is coded or stored in memory, and that the same meaning applies to both labels of the translation equivalents. How are the two languages identified in this memory store? Accordingly, there is some type of "tagging" mechanism that identifies words with the proper language at the time of retrieval (López & Young, 1974). The *separate* or *independence memory hypothesis*, on the other hand, proposed a memory organization in which the bilingual's two languages were organized in two separate independent memory stores: one memory store for each language, with information from one language not readily available to the other (cf. Heredia & McLaughlin, 1992). However, it is assumed that the only interaction between the two memories is through translation processes (McCormack, 1977). At this point, it is worth mentioning that these two hypotheses were mainly concerned with meaning and concepts, and not so much on other linguistic aspects such as phonemic (e.g., sound) or orthographic (e.g., spelling) representations.

These hypotheses make the following general predictions. The shared memory hypothesis predicts that because both languages share the same underlying code or meaning, both languages would show similar patterns or behave in the same way. This is to say that material or information that is learned in one language should be transferred to the other language. For example, if

it is learned in English that 3 + 4 = 7, this information should also be available to Spanish, and the bilingual should not have to relearn the same information in Spanish. Moreover, in bilingual research it is customary to distinguish between monolingual and bilingual modes as a way to describe if a bilingual speaker is using one language (monolingual) or two languages (bilingual). In experimentation, this is referred to as *within-language* or *between-language* conditions, respectively. In the typical bilingual experiment, word pairs such as *casa-hogar* or *house-home* are described as within-language synonyms. Similarly, word pairs such as *casa-house*, and *hogar-home* are considered between-language or *cross-language* synonyms or translations. As predicted by the shared memory hypothesis, a comparison between within- and between-language conditions would exhibit similar or identical results. In relation to the two-memory or interdependence hypothesis, the predictions are the opposite of the shared memory hypothesis. Because the bilingual's two languages are organized in separate stores, both languages should exhibit different patterns and behave very differently. Thus, a comparison between within- and between-language conditions would result in differences. Typically, percentage of recall is greater for the between- than the within-language conditions. In memory research, this is attributed to the possibility that during the learning or encoding process, bilinguals may encode the information to be learned in multiple ways, thus increasing the likelihood that the memory trace is strengthened and therefore remembered better at a later time. Which hypothesis does a better job of explaining bilingual memory? As it will become apparent from the following discussion, the evidence supports both hypotheses. In this discussion, representative studies supporting both hypotheses are reviewed.

Evidence for the Interdependence Hypothesis

In one experiment, López and Young (1974) asked whether information learned in one language would facilitate or transfer to another language as measured by a free recall task. To test this possibility, López and Young had Spanish-English bilinguals read a series of adjectives in English, (e.g., *angry, tired, smart*) or Spanish (e.g., *verde* [*green*], *hinchado* [*swollen*], *pelón* [*bald*]). Phase one of the experiment was designed to familiarize participants with the materials and have bilinguals learn the list of Spanish and English words. Participants were given no information about the purpose of this list. In the second phase or the testing phase, bilinguals listened to another list of words. However, depending on the experimental condition, words in this second list were either direct translations, or exactly the same words from the original list. To assess language transfer, and to serve as experimental controls, words that never appeared in the original list were included as well. To summarize, if a participant in phase one read the adjectives—*angry*, *tired*, *smart*—the list in phase two might contain the Spanish translations *enojado*, *cansado*, *listo*, or the same English words as the original list, but in different random order. Participants were then asked to recall as many words as possible**.** Figure 3.2 summarizes the results.

Inspection of Figure 3.2a shows that in comparison to Figure 3.2b, virtually all language conditions showed language facilitation or language transfer. Specifically, if during the learning phase the language of familiarization was English and the language of testing was a Spanish translation, the mean percentage of words recalled was 10.25 from Figure 3.2a, relative to 9.16 for the control condition from Figure 3.2b, for example. The same pattern is observed for Spanish-English (11.91) in Figure 3.2a, and English-Spanish (11.35) in Figure 3.2b. Likewise, both Spanish-Spanish and English-English within-language repetitions followed similar patterns. The finding that language transfer was possible demonstrated, as predicted by the shared memory hypothesis, that both languages shared the same underlying code. Otherwise, language transfer would not have occurred.

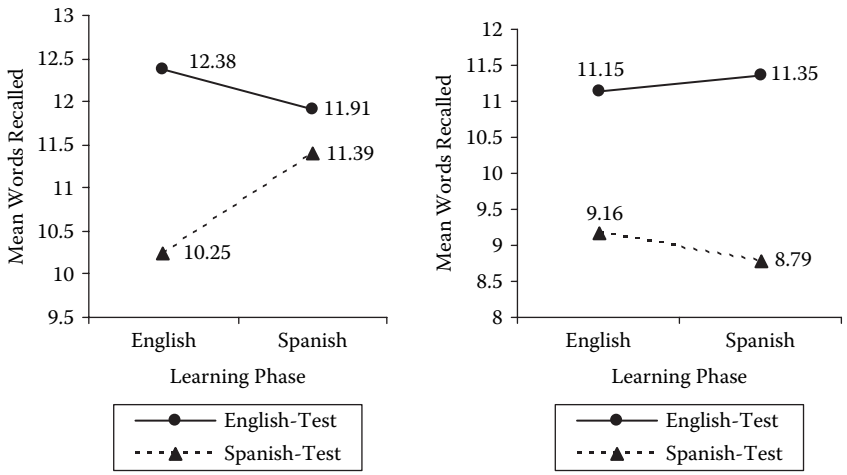

Figure 3.2a–b Mean of words recalled as a function of language of original learning (learning phase), and language of testing for the experimental condition in Figure 3.2a left side, and the control condition depicted in Figure 3.2b, right side (Figures adapted from López & Young, 1974, Table 1, p. 982).

Moreover, the fact that both between- and within-language conditions followed the same basic patterns further supports the shared-memory model.

In another highly cited study, Glanzer and Duarte (1971) investigated the *repetition effect* and the *spacing effect*, also known as the *distance* and *lag effect* in bilingual memory. Briefly, the general finding in the repetition effect literature is that words that are repeated more than once are remembered better, relative to a word that is non repeated. In the spacing effect, words are repeated; however, the repetitions are spread out or separated by one or more items over time rather than presented all at once (Matlin, 2005). The main idea of this study was to test the generalizability of these memory effects to bilingual speakers. Of particular interest was the comparison among the between- and within-language conditions. In this experiment, Spanish-English bilinguals studied a series of word lists containing between- and within-language word repetitions systematically divided into four distances of 0, 1, 2, and 5 intervening words. To illustrate, consider the following list of words: *store*, *casa* [*house*], *house*, *grass*, *pez* [*fish*], *grass*, *zapato* [*shoe*], *dog*, *tree*, *zapato*, *wheel*, *mono* [*ape*], *rice*, *perro* [*dog*]. From this list, notice that the words *store*, *pez*, *tree*, *wheel*, *mono*, and *rice* appear only once. These are the non repeated items. Further, note that *casa* is immediately followed by its translation *house.* This between-language word pair would correspond to a distance of zero because there are no items in-between the translation equivalents. The corresponding distances for the English-English word pair (*grass-grass*), the Spanish-Spanish (*zapato-zapato*), and the between-language word pair (*dog-perro*) are 1, 2, and 5, respectively. Note that in designing an experiment of this kind, the investigator must assure that the same number of language repetitions includes all possible distances. Memory retention was assessed by a free recall test given after list presentation. Figure 3.3 summarizes the results.

Figure 3.3 reports the results for the between- and within-language repetitions at distances 0, 1, 2, and 5. The between-language condition was created by combining the Spanish-English and English-Spanish word repetitions. Similarly, the within-language condition was created by combining the English-English and the Spanish-Spanish word repetitions. The open circle above

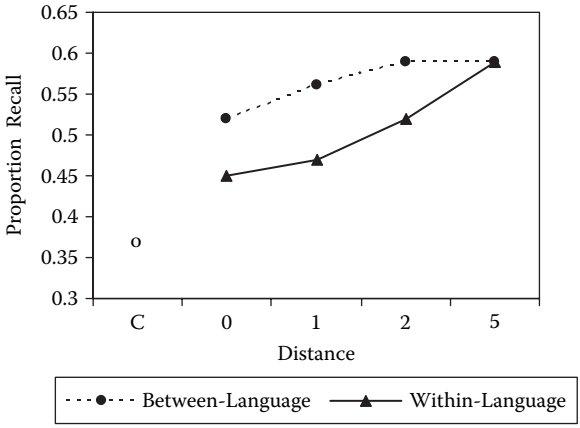

Figure 3.3 Proportion of words recalled as a function of between- and within-language conditions and distance (adapted from Glanzer & Duarte, 1971, Figure 1, p. 628).

C in Figure 3.3 represents the Spanish and English non-repeated words combined. In general, the percentage of recall for both between- and within-language conditions was much higher than the non-repeated condition. Moreover, note that although the between-language repetitions provided a higher percentage of recall at shorter distances, at distance 5 recall was identical to that of the within-language repetitions. Also, in relation to the predictions of the shared memory hypothesis, notice that both language repetitions exhibited the same patterns. That is, as distance increased from 0 to 5, the percentage of recall increased for both language conditions (see also Heredia & McLaughlin, 1992, for similar results).

Other studies involving more direct measures of semantic memory have arrived at similar conclusions. Typically, studies of semantic memory utilize reaction time (RT) as a measure of retrieval or search time. RT is typically measured in milliseconds (ms), and one second is equivalent to 1,000 ms. RT measures the time taken to retrieve or to search semantic memory for a particular word. Thus according to the shared memory hypothesis, because both languages are represented in one memory, retrieval or search of words from the bilingual's two languages should take similar amounts of time. In other words, a comparison between monolingual and bilingual conditions should exhibit similar RTs. To test this possibility, Caramazza and Brones (1980) utilized a semantic classification task. In this task, participants were first shown a Spanish or English word representing a category (e.g., *furniture* or *muebles*). Each category word was immediately followed by an instance or a member of that category (e.g., *bed* or *cama*). The participant's task was to determine if the particular instance presented was a member of the previously specified category. For example, given the category *furniture*, participants were required to decide, as fast as possible, if the word *bed* was or was not a member of the category furniture. This was done by pressing one of two computer response keys labeled "TRUE" or "FALSE." RTs represented the amount of time taken to decide whether the critical word was or was not a member of the specified category. Of special interest in this experiment was a comparison of the between-language conditions (e.g., *furniture-cama* and *muebles-bed*) versus within-language conditions (*furniture-bed* and *muebles-cama*). In general, results revealed virtually no differences in RTs for the between- and within-language conditions (for similar findings see Schwanenflugel & Rey, 1986), thus supporting the interdependency hypothesis. Thus, McCormack's (1977) survey of the bilingual memory

literature indicated that the bulk of the research evidence supported the bilingual shared memory hypothesis. However, this conclusion may have been too premature given the support for the independence hypothesis, to which we now turn.

Evidence for the Independence Hypothesis

A recurring issue in the bilingual memory literature is whether words or concepts in the bilingual's two languages are qualitatively different. One possibility, of course, is that words or concepts in bilingual memory are identical because both share the same code, as posed by the shared memory hypothesis. For example, Kolers and González (1980) demonstrated that bilingual synonym repetitions (e.g., *house-casa*) were no different than monolingual repetitions (e.g., *house-house*) as aids to retrieval even if these repetitions required more mental elaboration (Slamecka & Katsaiti, 1978). However, other findings (e.g., Basi, Thomas & Wang, 1997; Goggin & Wickens, 1971) suggest qualitative differences across the two concepts. Accordingly, this distinctiveness may be due to the manner in which the material was originally learned. It may very well be the case that during the learning process, concepts are coded into LTM in more than one way, with rich linguistic associations specifically related or "coded" to each particular language.

In a classic study, Goggin and Wickens (1971) effectively demonstrated qualitative and structural differences between the bilingual's two languages. To do this, Goggin and Wickens utilized the *proactive interference paradigm* (PI). This paradigm produces a very well-known and robust finding in the monolingual literature. In demonstrations of PI, older or already learned material interferes forward in time with the learning of new material. As a consequence, the learning of the to-be-learned material is greatly diminished as measured by a free recall task. To demonstrate, consider Lists 1–4 in the "fruits" category condition in Table 3.1. Each list is composed of two members of the category "fruit." In the typical PI experiment, participants study each list, and after each list, a free recall test assesses learning.

As shown by Figure 3.4, under the control condition, proportion of recall drops sharply from List 1 (65%) to List 4 (25%). PI, as pointed out by Goggin and Wickens, is partly due to item similarity (for the latest on PI and item similarity, see Hinson & Whitney, 2006). Therefore, PI could be prevented by changing the category or type of code in the studied lists. Table 3.1 shows that Lists 1–3 are made up of instances of "body parts" for the category shift condition. However, a category shift occurs in List 4—as it is made up of members of the category "fruit." Indeed, this category shift produces what is called *release from proactive interference*, and the proportion of recall increases as a consequence. For the category shift condition, Figure 3.4 shows a sharp decline of recall from Lists 1–3, as all the words are from the same category. However, notice how the category shift in List 4 triggers a release from PI and the proportion of recall increases significantly. Given that a change of category or a change of code induced release from PI, Goggin and Wickens asked whether the bilinguals' two linguistic codes were distinct enough to produce a release from PI.

To investigate this issue, in addition to the English control and category shift conditions described herein, Spanish-English bilinguals were given lists in which a language and a language + category shift occurred for both languages. From Table 3.1, notice that for the language shift condition, all four lists are composed of body parts. Notice that for List 4, *hígado* and *mouth* (translations: *kidney*, and *mouth)* are in Spanish. In the language + category shift condition, both the language (from English to Spanish) and category are altered (from body parts to fruits). Figure 3.4 summarizes the findings.

To summarize, tests 1–3 show the traditional buildup of PI, wherein previously learned material interferes with the learning of new (related material). No release of PI is evident for the control condition because all lists were from the same language and same category.

However, the change of category and language shift in the remaining conditions produced release from PI. More impressive was the finding that if both language and category shifts were combined, release from PI produced much higher recall rates than language or category shifts

Table 3.1 Example of an Experiment on Release from Proactive Interference

Condition	*List 1*	*List 2*	*List 3*	*List 4*
Fruits				
I. English	apple	grape	orange	apricot
(Control)	peach	cherry	plum	pineapple
Body Parts				
II. English	arm	eye	finger	apricot
(Category shift)	head	nose	hand	pineapple
III. English-Spanish	arm	eye	finger	hígado
(Language Shift)	head	nose	hand	boca
IV. English-Spanish	arm	eye	finger	durazno
(Language + Category Shift)	head	nose	hand	piña

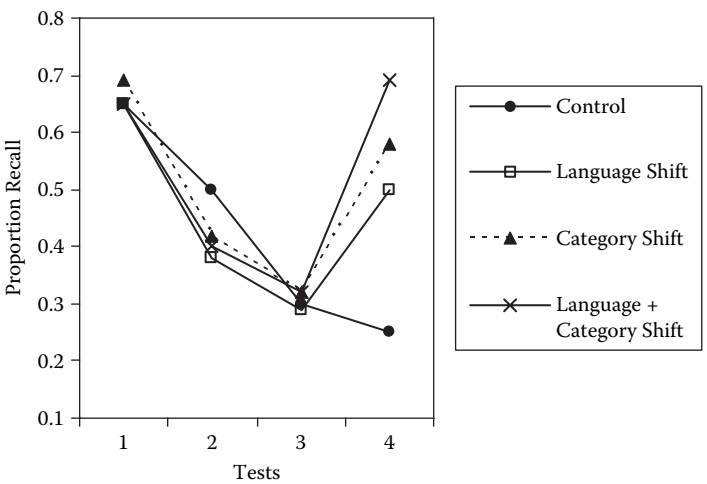

Figure 3.4 Proportion of words recalled as a function of language and concept shifts (adapted from Goggin & Wickens, 1971, Figure 1, p. 455).

independently. These results led Goggin and Wickens (1971) to conclude that highly fluent bilinguals were capable of encoding information in more than one dimension or using two distinctive codes. Although these researchers did not take sides on the issue of one or two memory systems, their results are clearly consistent with the general idea that the bilingual's two linguistic codes are distinct, and that the bilingual's two languages are represented in memory by two distinctive memory systems (see also Dillon, McCormack, Petrusic, Cook, & Lafleur, 1973).

In a study similar to that of López and Young (1974), Scarborough, Gerard, and Cortese (1984) asked whether Spanish-English bilinguals would show automatic transfer of word recognition experiences across their two languages. Language transfer in the RT literature is referred to as *priming*. In priming, response to a particular word is faster if a preceding or antecedent word is related, relative to an unrelated word. For example, response to "butter" would be faster if preceded by a related (e.g., *bread*) rather than an unrelated word (e.g., *desk*). Depending on the experiment, the priming could involve exact within-language (e.g., *war-war*) or between-language (e.g., *war-guerra*) repetitions. Scarborough et al. utilized a lexical decision technique to measure priming. In the lexical decision task, participants may be presented with an actual word in English (e.g., *bread*) or a nonword (e.g., *knote*) that is not found in the language. The participant's objective is to decide if a presented item is an actual word by pressing a key or button labeled YES, if it is an actual word, or NO, if it is not an actual or legal word in English. More often, however, real words are of more theoretical value than nonwords (see Altarriba & Basnight-Brown, 2007, for a review of the cross-language priming literature).

In summary, Scarborough et al.'s (1984, Experiment 1) study involved two parts. In the first part, bilinguals made lexical decisions on a series of Spanish and English words. The results for the first part of the experiment showed that bilinguals were faster to respond to English words than to Spanish words. Accordingly, bilinguals were slower to respond to Spanish words simply because they were dominant in their English language. For the second part of the experiment, bilinguals were asked to respond to the same English word previously seen. This English-English experimental condition is essentially the same as a within-language condition. However, for the between-language condition (Spanish-English), bilinguals made lexical decisions to the English translations of the previously seen Spanish word. The general findings showed language priming, but only for the within-language conditions. In other words, bilinguals were faster to respond to *war* the second time around, relative to the first exposure, but only if they had seen *war* before in the monolingual condition. However, the between-language condition failed to show priming or language transfer. Previous exposure to *guerra* did not facilitate response to its English translation *war* (see also Gerard & Scarborough, 1989; Kirsner, Smith, Lockhart, & King, 1984; cf. Zeelenberg & Pecher, 2003).

Other studies employing RT techniques and sentence comprehension have found that bilinguals are usually faster to process or comprehend monolingual than bilingual sentences (Heredia & Altarriba, 2001). In the typical experiment, bilinguals are presented with monolingual (i.e., within-language) and bilingual (i.e., between-language) sentences of the type described in the introduction (1a–b), and 2a–2b following:

(2a) After LUNCH, the children asked for a piece of CAKE for DESSERT
(2b) Depois do LUNCH os miudos pediram uma fatia de CAKE para DESSERT

Sentence 2a is a monolingual sentence. Sentence 2b is a code-switched or mixed language sentence. It is a code-switched sentence because it contains words from English and Portuguese. One important aspect to underscore is that code-switching has its own grammatical rules and does not occur randomly (Lederberg & Morales, 1985). Soares and Grosjean (1984) had Portuguese-

English bilinguals listen to monolingual and bilingual sentences similar to 2a–b. Of special interest was the comparison between a monolingual word target in sentence 2a (e.g., *CAKE* in sentence 2a) and the same word in the code-switched sentence 2b. At the beginning of each sentence, participants were provided with a phonemic cue that directed them to the critical word. For sentence 2b, if the critical target was *CAKE*, the initial phonemes of the word (e.g., /ca/) were provided. The bilinguals' objective was to use the phonemic information as they listened to the sentences to identify the appropriate critical word. This experimental technique is known as the *phonemic monitoring task*. Upon the identification of the critical target, bilinguals performed lexical decisions on these words. The findings showed that Portuguese-English bilinguals were much faster responding to the monolingual critical words from sentence (2a) than the code-switched words in sentence (2b). These patterns of results are robust and have been replicated using different experimental techniques (see for example, Altarriba, Kroll, Sholl, & Rayner, 1996), and with children as well (see for example, Heredia, Mendiola, Tuttle, & Greybeck, 2005; but see Li, 1996). The finding that the comprehension of code-switched information takes significantly more time than monolingual material has been taken to support the independence of the bilingual's two languages. Moreover, the differences in time between the monolingual and code-switched words have been interpreted as the time required for a cognitive *input switch* to "turn off" (i.e., inhibit) one language while the other is "turned on" (activated) (MacNamara & Kushnir, 1971). Although this proposed cognitive input switch is intuitively appealing and accounts for the findings, at issue is whether this linguistic switch is psychologically real (for a review see Green, 1998; see also Li, 1996). Some researchers have proposed that these time differences may also reflect the possibility that during word retrieval, the bilingual's first language (L1) memory is searched first, and only after that the second language (L2) is searched (Soares & Grosjean, 1984). Other proposals view this time issue representing a "competition" between the bilinguals' two systems to determine which language (i.e., L1 or L2) is more highly activated and most likely "to win" the competition (e.g., Heredia, 2005; cf. Dijkstra, & Van Heuven, 2002).

One major drawback stemming from the research described herein concerning both hypotheses is that some of the research findings were open to interpretation. That is, depending on the investigator's theoretical preference, the same results could be used to support one or the opposing hypothesis. As an example, consider López and Young's (1974) results shown in Figures 3.2a–b. Pairing each language familiarization condition with its corresponding language at test shows that recall differences were larger for the bilingual (English-Spanish vs. Spanish-English) than the monolingual (Spanish-Spanish vs. English-English) language conditions. The opposite holds true for the language control conditions for Figure 3.2b. Indeed, these differences are consistent and would be generally predicted by the language independence hypothesis that predicts language differences. In addition, Glanzer and Duarte's (1971) findings (see Figure 3.3) are also open to interpretation, especially at distances 0, 1, and 2, where free recall for the between-language repetitions is greater than the within language repetitions (see for example, Paivio, Clark, & Lambert, 1988). In short, the independence and interdependence hypotheses were accurate in describing and proposing solutions to the theoretical issue of bilingual memory; yet, their formulations and descriptions were too general, thus preventing the generation of clear and testable predictions. This limitation, as argued in the following sections, is overcome by current bilingual models that generate clear, distinct, and testable predictions.

Given that the previous research findings support both hypotheses, what can we conclude about bilingual memory and how can these results be reconciled into a plausible theory of bilingual memory representation? Durgunoğlu and Roediger (1987) effectively demonstrated that the mixed results in the bilingual memory literature were due primarily to the fact that previous

research failed to consider *task demands* (see also Heredia & McLaughlin, 1992; Zeelenberg & Pecher, 2003). The general argument was that the evidence for the one- or two-memory hypotheses depended upon the processing demands of the retrieval tasks used. In other words, free recall and recognitions tasks that were sensitive to semantic and conceptual processes yielded results consistent with the shared memory model (see for example earlier discussions for Glanzer & Duarte, 1971; Kolers & González, 1980; López & Young, 1974; Slamecka & Katsaiti, 1978). On the other hand, tasks that were sensitive to perceptual or lexical processes (i.e., the similarity between the surface features of the study and test stimulus) generally produced language-specific results, consistent with the two-memory model. Among some of the tasks identified as producing language-specific results were lexical decision tasks, word-fragment completion, and lexical naming (see for example the previous discussions for Gerard & Scarborough, 1989; Kirsner et al., 1984). As an interesting contrast, recall that the language transfer issue was addressed by López and Young (1974) using a recall task, and by Gerard and Scarborough (1989) using a lexical decision task. What is noteworthy is that the different tasks produced different results. The free recall task produced language transfer, and the lexical decision task did not. This pattern of results is consistent with the *tasks demands* account, and leads to the conclusion that in studying bilingual memory, task requirements should be considered. Conceptually driven tasks, such as free recall measure the bilingual's semantic and conceptual word representations, thus supporting a one memory system view. Moreover, these tasks can be seen as measuring the processes required to access the overall general knowledge store of the two languages, or the general conceptual system. In contrast, data-driven tasks (e.g., lexical decision, word-fragment completion, and naming) that involve perceptual processing support the independent memory hypothesis. As such, these tasks can be seen as measuring the processes required to access the bilingual lexical system.

To summarize, Durgunoğlu and Roediger's (1987) findings lead to the general conclusion that both the independence and interdependence hypotheses were correct, and that both accounts were actually describing bilingual storage at different levels. The shared-memory store hypothesis was seen as accurately describing bilingual memory representation at the semantic or meaning level where information was readily available to the bilingual's two languages. In contrast, the separate memory store hypothesis was seen as describing a bilingual memory structure in which the bilingual's two languages were stored in separate mental dictionaries or lexicons that were specific to each language. What is the relationship between the semantic memory store and the bilingual lexicons, and how are these two systems interrelated? Indeed, this is the focus of the hierarchical models described shortly. However, before discussing these models, let us address briefly the recurrent and popular issue of the compound versus coordinate bilingual distinction, and Paivio and Desrochers's (1980) dual-coding theory that bears on the issue of multiple memory storage for bilinguals.

Compound versus Coordinate Bilingualism

Is the context in which the L1 and L2 were learned likely to influence how bilinguals represent their languages in memory? Ervin and Osgood (1954), based on the seminal paper by Weinreich (1953), proposed a bilingual memory structure that depended largely on the context in which it was learned (see also Marian, this volume). The proposal was that if a bilingual learned both languages simultaneously or through a teaching method that involved associating or translating the to-be-learned material in the L2 to the L1, this bilingual would be a *compound bilingual*. This bilingual in turn would develop a linguistic representation in which corresponding words from

the two languages underlie one conceptual or meaning-based representation. Thus, according to this system, the words *love* and *amor* (its Spanish translation), although having different labels, would share the same meaning. In contrast, a *coordinate bilingual* would arise from a situation in which the bilingual's two languages were learned in different places (e.g., home vs. school), taught by different people and under different situations. Thus, a coordinate bilingual would develop a linguistic system in which words from each language are directly associated to a distinct and separate conceptual or meaning-based representation (e.g., Gekoski, 1980). Thus, for a coordinate bilingual, the words *love* and *amor* would have different meanings.

In general, the compound-coordinate distinction is highly intuitive and easily understood. However, the evidence for this theoretical distinction is quite mixed (see for example Guttfreund, 1990; Kolers, 1963). Actually, the conceptual difficulties encountered by the shared-memory and the independent-memory hypotheses apply to this proposed memory organization as well. To make the bilingual compound-coordinate systems more testable and open to experimentation, the compound system was reformulated as the shared-memory hypothesis; whereas the coordinate system became the memory-independence hypothesis.

Is the compound-coordinate bilingual distinction useful? While this concept remains popular in some areas of education and psychology, as pointed out by Heredia and Brown (2004), this theory implies that during language learning, bilinguals must code linguistic information in a context-specific manner and that this information remains somewhat unaltered over time. Indeed, this line of reasoning is consistent with Kolers's (1963) original argument:

> One can also take issue with the assumption in the [compound-coordinate] dichotomy that linguistic performance is forever determined by the way the bilingual learned [the L2] initially, an assumption which suggests that experience obtained living in a culture after its language was learned will not affect usage. This does not seem to be a reasonable way to describe an adult capable of assimilating new experiences. (p. 299)

Moreover, any differences or similarities that might arise during language learning may be due to the nature of the words or concepts themselves (Heredia & Brown, 2004). For example, some researchers (e.g., de Groot, 1992; de Groot, Dannenburg, & Van Hell, 1994) have convincingly argued that certain words (e.g., abstract words) are more likely to exhibit language-specific meanings. *Love* and *amor*, for example, are similar in some general aspects; however, their usages are quite distinct. In English, for instance, it would be quite acceptable "*to love a rock*" but in Spanish, the verb would have to be substituted by *gustar* as in "*I like that rock.*" Failure to know this distinction would simply suggest that the particular individual lacks expertise in the particular language. In contrast, concrete words (or translations) and cognates (words that share meaning and orthographic representation) are likely to show higher levels of associations across languages. Indeed, the theoretical compound-coordinate distinction as a general model of bilingualism, and a model of how the L2 is learned and organized, would be difficult to defend, especially when bilinguals achieve higher levels of proficiency in the L2, or the L2 becomes the dominant language (e.g. Heredia & Brown, 2004; Kolers, 1963; see also Sebastían-Gallés, Echeverría, & Bosch, 2005).

Bilingual Dual-Coding Theory

Paivio's *bilingual dual-coding theory* (e.g., Pavio & Desrochers, 1980), like the independence hypothesis, poses separate but interconnected bilingual memory stores. However, unlike any of

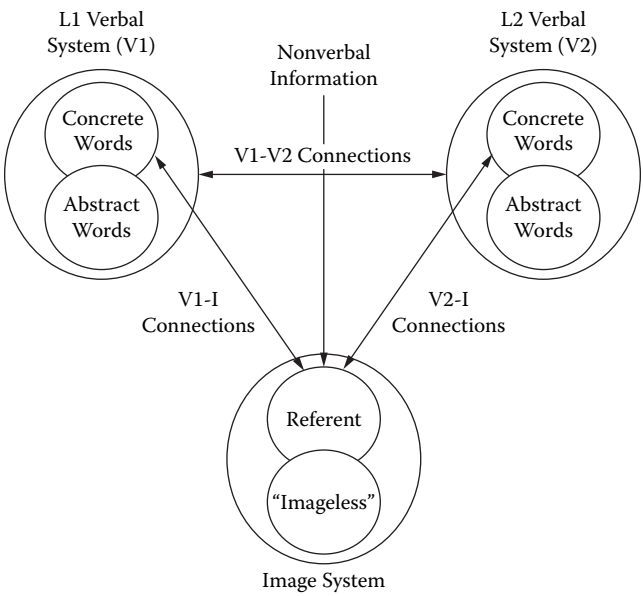

Figure 3.5 The bilingual-coding theory showing the verbal systems (V1 and V2) corresponding to L1 and L2, and the Image (I) systems along with their functional interconnections (adapted from Paivio & Desrochers, 1980, Figure 1, p. 391).

the bilingual proposals discussed so far, this theory is formulated well enough so as to generate specific predictions about bilingual memory. Figure 3.5 illustrates a simplified version of the bilingual dual-coding theory. The model assumes one verbal system (V1) for the L1 and a second verbal system (V2) for the L2. Accordingly, the verbal systems are highly specialized in linguistic processing and speech production. Although the verbal systems are separate and able to function independently, both systems are linked by V1–V2 connections. The connections between translation equivalents (e.g., *boy-niño*) appear to be stronger and more readily accessible than bilingual paired associates (e.g., *girl-niño*). It follows then that during retrieval, bilingual translations should provide better recall than bilingual paired associates. As argued by Paivio and Desrochers, research findings in which bilinguals generate associations seem to follow this pattern.

Additionally, the model poses an image system (I). The image system appears to be highly specialized in the processing of perceptual or visual information that involves nonverbal information and events, and for generating images of such events (Paivio, 1991; Paivio & Desrochers, 1980).

It is also assumed that pictures in this system are stored as true copies, analogs, or templates of the original representation (Paivio, 1991). This assumption is a controversial one because the opposing view suggests that pictures are stored as general verbal descriptions. Although this system is capable of functioning separately, it is connected to both verbal systems via links from the verbal system for the L1 to the image system (depicted in Figure 3.5 as V1-I) and from the verbal system for the L2 to the image system (depicted as V2-I in Figure 3.5). As a consequence of this interconnectivity, the verbal and image systems are mutually influenced.

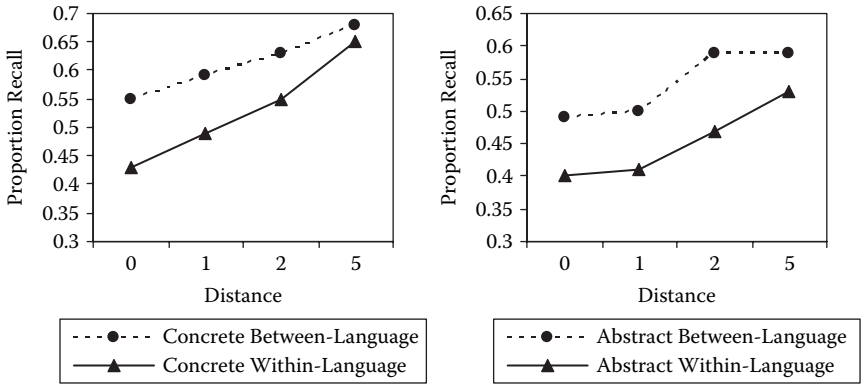

Figure 3.6a–b Proportion of words recalled as a function of between- and within-language conditions, concrete (Figure 3.6a, left) versus abstract (Figure 3.6b, right) and distance (adapted from Paivio, Clark, & Lambert, 1988, Figure 2, p. 168).

For instance, a concrete word such as *table*, from V2 may trigger a referent or a picture of a *table* in the imagery system. Likewise, a picture of a *table* may activate its equivalent label in V1, or V2, or in both. Indeed, this interconnectivity assumption leads to the prediction that during learning or encoding processes, words or stimuli that have access to the two systems or codes (verbal + nonverbal) would exhibit higher retrieval than stimuli that have access to only one code (verbal or nonverbal).

In general, the strength of the bilingual dual coding theory is its ability to explain the *bilingual concreteness effect* (e.g., de Groot, 1992, de Groot et al., 1994). This highly replicated effect in the monolingual and bilingual research demonstrates that words that represent tangible objects (e.g., *table*) are recalled better than abstract words that typically represent intangible ideas or concepts (see also Altarriba & Bauer, 2004). Figure 3.6a–b is a replication of Glanzer and Duarte's (1971) shown in Figure 3.3, but in this case, carefully separating concrete and abstract words. Inspection of these results shows that, as expected, the proportion of recalled words is higher for concrete (Figure 6a) than for abstract words (Figure 3.6b). Notice that the two language conditions exhibit virtually the same pattern in both the concrete and abstract conditions. Why are concrete words remembered better? Concrete words, because of the virtue of their inherent high imagery, can be coded using the verbal and image system, for a total of two codes (see Figure 3.5). Abstract words, on the other hand, can only be coded using the verbal system.

Another bilingual effect supported by dual-coding theory is the finding that retrieval for between-language conditions is typically higher than for within-language conditions, as summarized following in Figures 3.6a–b, and reported by other researchers (e.g., Basi et al., 1997; Glanzer & Duarte, 1971; Vaid, 1988; but see Kolers & González, 1980; Slamecka & Katsaiti, 1978). Retrieval for the between-language condition (e.g., Spanish-English), at least at short distances, has benefited from a verbal code from L1 and another verbal code from the L2. In contrast, the within language condition (e.g., English-English) can only benefit form one verbal code. An in-depth analysis for concrete words in the between-language condition in Figure 3.6a suggests that the between-language conditions may possibly have access to three codes, one for each verbal system and the other from the image system (V1 + V2 + I); whereas concrete words in the within-language condition may have access to only two codes, one from one verbal system and another from the image system (V1 or V2 + I).

Bilingual dual-coding theory also accounts for the general finding that pictures are remembered better than words, as measured by free recall. This robust finding is known as *the picture superiority effect*. This effect is not unique to bilingualism because most of its evidence comes from monolingual studies. However, this effect has been replicated with bilinguals as well (e.g., Paivio & Lambert, 1981; Vaid, 1988). Why are pictures better remembered than words? According to the theory, a picture in the image system may be able to elicit its label from V1 or V2. In any case, access to the image system appears to be much superior to the language code because it profits from the mnemonic superiority of the image code (Paivio & Lambert, 1981).

In short, bilingual dual-coding theory's proposal was that bilinguals organized their languages into separate but interconnected verbal systems, and one language-free image system interrelated to the verbal systems as well. In general, this theory is perhaps one of the first theories to provide a clear and concise comprehensible explanation of a possible bilingual memory structure, and the first one capable of generating clear and testable predictions. It is not clear as to the reasons why bilingual dual coding-theory did not generate as much research as its monolingual predecessor. However, its influence on current models of bilingual memory that assume separate verbal systems and shared conceptual representations is unquestionable. The following section focuses on these types of models collectively known as hierarchical models.

Hierarchical Models

Word Association and Concept Mediation Models

Hierarchical models start with the assumption that bilinguals organize their languages into one general conceptual level that is shared by the two languages, and a lexical level that is particular to each language. This conjecture is illustrated in Figures 3.7a–b. The conceptual system is represented by the rectangles labeled "concepts" and the lexical level is depicted by the squares labeled "L1" and "L2" for first- and second-language lexicons, respectively. The shared conceptual system is said to contain general abstract information that is language free; the lexical level represents a bilingual's two languages in separate mental lexicons or dictionaries, with information specific to each language (Potter, So, Eckardt, & Feldman, 1984; for similar proposals see Paradis, 1980; Weinreich, 1953; see also Marian this volume). To clarify, these models are hierarchical because they distinguish between a general level (i.e., the conceptual system) and language-specific mental lexicons. Another important assumption of these models, as shown in Figures 3.7a–b, is that the L1 lexicon is larger than the L2 lexicon. This difference in lexicon size, as argued by Kroll and Stewart (1994), reflects the notion that bilinguals know more words in their L1 than their L2.

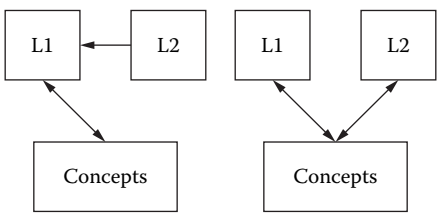

Figure 3.7a-b The word association model (Figure 3.7a, left) and the concept mediation model (Figure 3.7b, right) (adapted from Potter et al., 1984, p. 25).

Two hierarchical models were proposed to explain bilingual memory. In the *word association model* (Figure 3.7a), Potter et al. proposed a bilingual memory structure in which the bilinguals' two languages interact at the lexical level or word level, based on translation equivalents. Thus according to this model, words from the bilingual's L2 are directly associated with words from the L1. Access to the general conceptual store (i.e., "concepts" in Figure 3.7a) from the L2 is not possible, unless the L2 word is translated into the L1, as shown by the directional solid arrow from the L2 to the L1 lexicon. In contrast, the L1 is hypothesized to have direct access to the conceptual store. This link is represented by the bidirectional solid arrow from the L1 to the conceptual system. Thus, to know the meaning of an English word (e.g., *house*), a Spanish-English bilingual would have to translate it into Spanish (e.g., *casa*), the L1.

The *concept mediation model* (Figure 3.7b), on the other hand, assumed that the bilingual's two languages operated independently of each other. As proposed by Potter et al., both lexicons were independently capable of accessing the conceptual system. According to this model, a bilingual speaker was able to access the meaning of a particular concept regardless of the language, and unlike the word association model, without having to translate from the L2 to the L1. As argued by Potter et al. the native and nonnative languages of a bilingual operate independently so that words were not associated interlingually, but instead they were associated with the nonlinguistic conceptual system common to both languages.

To test these models, Potter et al. (1984) used a picture naming and a translation task. In the picture naming task, Chinese-English bilinguals were presented with a picture, and the objective was to name the picture in their L2, English. For the translation task, they translated a word from their L1 (Chinese) to their L2 (English).

The two models make specific predictions regarding picture naming and translation. For picture naming, the word association model (Figure 3.7a) predicts the following steps: (a) recognize the picture, (b) retrieve the concept of the picture—actually going into the conceptual system, (c) retrieve the name or label of the picture in the L1—going from the conceptual system to the L1 lexicon, (d) translate word into the L2, and (e) say the name of the picture in the L2. Note that in step (a), during the recognition of the picture, recognition is assumed to be language-free. In other words, at this level, the picture has not yet been labeled. In fact, hierarchical models assume that in addition to the general conceptual system and the lexicons, there is an additional image store that is specifically involved with pictures (Paivio & Desrochers, 1980; Potter et al., 1984). On the other hand, translating from L1 to L2, the word association model predicts the following steps: (a) recognize the word in the L1—going directly into the L1 lexicon, (b) translate the L1 word into the L2, and (c) say the word in the L2. These three steps, as opposed to the five steps for picture naming, translate into less response time. Thus, according to the word association model, translating an L1 word into L2 takes significantly less time than naming a picture in the L2.

In contrast, the concept mediation model (Figure 3.7b), predicts no differences between picture naming and translating into the L2. Specifically, picture naming requires the following steps: (a) recognize the picture, (b) retrieve the concept of the picture, (c) retrieve the name or the label of the picture in the L2—the L2 lexicon can be accessed directly from the conceptual system, and (d) say the name of the picture in the L2. Likewise, translating into L2 would require: (a) recognize the L1 word, (b) retrieve the concept of the word, (c) retrieve the name of the word in the L2, and (d) say the name of the picture in the L2.

Potter et al.'s (1984) results showed that their Chinese-English bilinguals showed no differences in naming or translating into the L2, as predicted by the conceptual mediation model, regardless of the participant's L2 proficiency. These results led Potter et al. to conclude that words of a second language were associated with corresponding words in the L1 via a common conceptual store, and

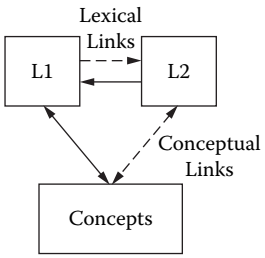

Figure 3.8 The revised hierarchical model (adapted from Kroll & Stewart, 1994, p. 158).

not by direct associations between vocabulary items, as predicted by the word association model, even for nonfluent bilinguals. However, other evidence (see for example, Kroll & Sholl, 1992; Kroll & Stewart, 1994) suggested that the word association model described a bilingual structure corresponding to bilinguals at early stages of L2 learning, associating every new L2 word learned with the L1 translation equivalent. In contrast, the concept mediation model described a bilingual structure corresponding to bilinguals with high proficiency levels in their L2. More important were the findings showing that bilinguals translated faster from their L2 to L1 than their L1 to L2. This translation asymmetry held for early and advanced bilinguals (Kroll & Sholl, 1992). Both the word association and the concept mediation models could not account for this pattern of results. To account for these findings, Kroll and Sholl (1992) and Kroll and Stewart (1994) proposed a revised version in which the word association and concept mediation models were incorporated into the revised hierarchical model shown next in Figure 3.8.

The Revised Hierarchical Model

According to the revised hierarchical model (RHM) depicted in Figure 3.8, the bilingual lexicons are bi-directionally interconnected via *lexical links*. The lexical link (represented by the solid arrow) from the L2 lexicon to the L1 lexicon is stronger than the L1 to L2 link, to reflect the way the L2 was learned. Accordingly, during L2 acquisition, bilinguals learn to associate every L2 word with its L1 equivalent (e.g., learn *house* and associate it with *casa*), thus forming a lexical-level association that remains active and strong (Kroll & Stewart, 1994). Furthermore, this link is assumed to be sensitive to processes that require physical or perceptual characteristics of word translation equivalents. Stronger lexical links from L2 to L1, than in the reverse direction, also reflect the bilingual's ease of translation. Thus, for a native Spanish speaker, it would be easier to translate *house* to *casa* than *casa* to *house* because every L2 word is mapped onto its L1 equivalent, but not every L1 word is mapped onto its L2 equivalent (Kroll & Sholl, 1992; Kroll & Stewart, 1994). Moreover, the connection from the L1 to L2 language lexicon (depicted by a broken line) is assumed to be weaker because of a lack of translation practice. However, this link is hypothesized to be sensitive to semantic factors or semantic (meaning) processing.

The conceptual store and the lexicons are connected via *conceptual links*. The conceptual link from the L1 (depicted by a solid line) is stronger than the link from the L2 (represented by a broken line). This difference in strength reflects the fact that L1 is the native language, and bilinguals are more familiar with word meanings in their L1 (Kroll & Sholl, 1992; Kroll & Stewart, 1994).

Although it is theoretically possible that the link from L2 to the conceptual store may develop strong connections, Kroll and Stewart argue that this link remains relatively weaker, even for bilinguals with high L2 proficiency levels.

Support for the RHM is obtained from experiments that involve translations from L1 to L2 and from L2 to L1. In the typical experiment, bilinguals are presented with an L1 word (e.g., *casa*) and asked to generate a translation in their L2 (e.g., *house*), and vice versa. The general finding, as predicted by RHM, is the translation asymmetry where translating from L2 to L1 is faster, takes less time, than translating from L1 to L2. Translating from L1 to L2 takes significantly more time than L2 to L1 because the former is achieved through concept mediation and the latter through word-word (translation) associations. Thus concept-mediated retrieval tasks take significantly more time than lexically-mediated or word-word association tasks (Potter et al., 1984; La Heij, Hooglander, Kerling, & Van Der Velden, 1996).

Evidence supporting the assumption that that the bilingual's two lexicons are sensitive to semantic (meaning) and lexically based information comes from Kroll and Stewart (1994). Kroll and Stewart utilized a translation task and manipulated the semantic context in which translations were performed. Participants in this task translated L1 to L2 or L2 to L1 in randomized or categorized (e.g., *dress*, *suit*, and *pants* belong to the category *clothes*) lists of words. The question of interest was whether L1 to L2 translations would be affected more by the change of semantic context (i.e., categorized vs. randomized lists) when compared to L2 to L1 translations, which were assumed to be lexically mediated. Because of the finding that L1 picture naming—which requires conceptual-semantic processing—produced category interference with categorized lists and not randomized lists (Experiments 1 and 2) and that translations are similar to L1 picture naming (Potter et al., 1984), Kroll and Stewart predicted that if L1 to L2 translations were indeed conceptually mediated, L1 to L2 translation would also exhibit category interference.

In short, Kroll and Stewart found, as predicted by the RHM, that L1 to L2 translations were indeed influenced by the change in semantic context of the lists. It took more time to translate categorized lists of words from L1 to L2 than to translate randomized lists from L1 to L2. In contrast, semantic context did not affect L2 to L1 translations. More interestingly, L2 to L1 translations behaved similarly in both the naming and translation tasks.

Additional support for this model comes from experiments reporting asymmetrical cross-language *priming effects*. Briefly, priming is the phenomenon in which a word (e.g., *war*) is responded to faster when preceded by a related word (e.g., *peace*) than when preceded by a nonrelated word (e.g., *cat*). In the bilingual version, participants are presented with a bilingual word pair that is either related (*peace-guerra: war*) or unrelated (*peace-gato: cat*). In one language condition, the prime may be in L1 (*paz*) and the target in L2 (*war*) or vice versa. In general, cross-language priming is obtained, but only if an L2 target is preceded by a related rather than an unrelated L1 prime (but see Fox, 1996; Keatley & De Gelder, 1992). In contrast, regardless of the relatedness between the target and prime, no cross-language priming is obtained if the critical prime is in the L2 (e.g., Fox, 1996; Keatley, Spinks, & De Gelder, 1994). That is, cross-language facilitation is obtained only if the prime is in L1 and the target is in L2. Consistent with the revised hierarchical model, the results suggest that accessing L2 from L1 is conceptual because it is achieved via the conceptual store or through concept mediation that is the locus of the semantic priming effect (Keatley et al., 1994, p. 77). On the other hand, accessing L1 from L2 takes place only at the lexical level, thus producing no semantic priming (see Altarriba & Basnight-Brown, 2007, for a comprehensive review of priming effects across languages).

However, experimental findings are beginning to call into question some of the RHM's main assumptions. For example, some studies have suggested that contrary to the claims of RHM,

both L1 to L2 and L2 to L1 translation directions may be sensitive to meaning-based processing (e.g., de Groot et al., 1994; Heredia, 1995, 1997; La Heij et al.; see also Altarriba & Mathis, 1997; Finkbeiner, Forster, Nicol, & Nakamura, 2004). For example, Heredia (1995, 1996) had Spanish-English bilinguals translate concrete and abstract words in both language directions. Heredia's results revealed no translation time differences for concrete words in both language directions, suggesting that both translation directions were sensitive to the semantic factors provided by the concrete words (see also de Groot, 1992; de Groot et al., 1994). More inconsistent with the predictions of the RHM was the finding that in the abstract condition, translating from L1 to L2 was actually faster than translating from L2 to L1. At least in the abstract condition, it appeared that the bilingual's L1 had actually become the L2 (see also Altarriba, 1992; Altarriba, 2001; cf. Jiang & Forster, 2001).

Indeed, these results led Heredia (1997; Heredia & Altarriba, 2001; Heredia & Brown, 2004) to conclude that the RHM did not allow for the possibility that the effects of translation direction and strength of word translations, and to some extent priming, were not fixed characteristics in bilingualism. Thus unlike the predictions of the formulation of RHM, the L1 can fall in strength while the L2 can become the dominant language. As pointed out by Heredia and colleagues, bilingual memory representation is not a static but rather a dynamic system that can be influenced by language usage.

Thus, to account for the bilingual translation reversal described herein, Heredia (1997) and Heredia and Brown (2004) proposed that in studying bilingual memory representations, language dominance, or which language is used more frequently, should be considered. Put differently, words in the language that is used more frequently will be responded to more quickly. In contrast, words in the language that is used less frequently will be responded to slower. Thus, according to the *language dominance* argument, regardless of which language was learned first, the more active (dominant) language would determine which lexicon would be retrieved faster. According to this view, the bilinguals in Heredia's (1995, 1997) experiment were faster in accessing their L2 lexicon simply because it was the language they used more frequently or their most dominant language. Thus, it would be theoretically possible for the bilingual's L2 to become the dominant language and the L1 to become the least dominant language. Therefore, it would be safe to suggest that regardless of which language was learned first, the more frequently used language will most likely subordinate the other (Heredia & Brown, 2004, p. 239). Basnight-Brown and Altarriba (2007) also reported a similar reversal in language dominance in participants who demonstrated significant priming for word translations across languages, but less priming for semantically-related word pairs under the strictest of testing conditions.

Distributed Conceptual Feature Model

Representations at the Word Type Level

The next model discussed is de Groot's distributed conceptual feature model of bilingual memory. This model, unlike the other models discussed in this section, allows for the possibility that bilingual memory may be represented at the word level (e.g., de Groot, 1992, 1993; de Groot et al., 1994; Kroll & de Groot, 1997; Van Hell & de Groot, 1998). This model, like hierarchical models, distinguishes between the lexical level, represented by the open circles labeled "L1" and "L2" for first- and second-language lexicons, and the conceptual level depicted by small solid and open circles in Figure 3.9a-c. In direct contrast to the revised hierarchical model described before, one

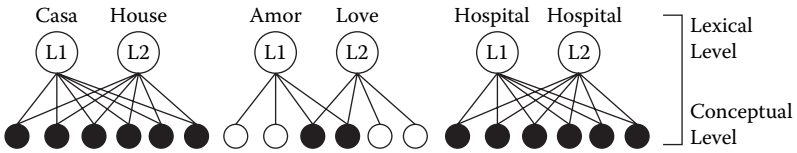

Figure 3.9a–c The distributed conceptual feature model of bilingual memory for concrete words (Figure 3.9a left), abstract words (Figure 3.9b, middle) and cognates (Figure 3.9c, right) (adapted from de Groot, 1992, p. 1016, Figure 2).

important aspect of the distributed conceptual feature model is that it elaborates on how the conceptual store may be represented at the word level for different word types.

As can be seen in Figure 3.9, this model postulates connections from the lexicons to the conceptual nodes or features that represent each word meaning. The number of conceptual features or elements in these memory structures may determine their activation or translation performance. The more similar two concepts are, the more "meaning elements" they would have in common. It follows then that the more feature or meaning elements overlap between words across languages, the more the concepts would be alike. Likewise, the less feature overlap across languages, the more different or dissimilar the concepts would be. For example, it has been argued by de Groot and colleagues that concrete words (Figure 9a) are more likely than abstract words (Figure 3.9b, middle) to share a number of semantic features across languages, or Spanish and English in this particular case. Figure 3.9a depicts an example of concrete words across languages in which the feature overlap at the conceptual level for Spanish *casa* and its English translation *home* is complete. The same argument applies to cognate words (words that are spelled similarly and have similar meanings across languages) in Figure 3.9c. Figure 3.9b, in contrast, depicts a configuration for *amor* and translation equivalent *love* with very little featural overlap. Therefore, concrete and cognate words are more likely to be very similar in meaning across languages, whereas abstract words are more likely to exhibit language specific information (e.g., de Groot, 1992, 1993; de Groot et al., 1994; Van Hell & de Groot, 1998). Such is the case with abstract words such *amor* and its English translation equivalent *love*. Although both words are roughly similar in both languages, *love* in English is less constrained and could be used for animate (living things) and inanimate (nonliving things). Spanish, on the other hand, more frequently constrains the usage of *amor* to living things and more specifically to some form of human relationships such as *amo a mi esposa* (translation: *I love my wife*), but not *amo a mi padre* (translation: *I love my father*); in which case, *I love my father* would become *quiero a mi padre*. However, it would be permissible to talk about *amor de padre o hijo* (translation: *father's love, children's love*) or *cuidar el jardín con amor* (Translation: *to take care the garden with love*). Once again, the English language does not have these semantic constraints.

In general, evidence for this model comes from experiments revealing the *concreteness effect*, in which concrete words are recognized and translated faster than abstract words (de Groot, 1992; Heredia, 1995; Van Hell & de Groot, 1998). The concreteness effect has been attributed to the possibility that concrete words provide more imagery and have access to multiple codes (e.g., Paivio et al., 1988), are more frequently used and acquired earlier than abstract words (Schwanenflugel, Akin, & Luh, 1992), are easier to retrieve and are more accessible. Other recent studies

(e.g., Van Hell & de Groot, 1998) suggest a distinction between the grammatical status of a word; nouns are more likely to behave similar to concrete words, and verbs are more likely to behave similar to abstract words.

However, as pointed out by Heredia and Brown (2004) there are certain situations in which even concrete words maintain some level of language specificity. Such is the case with the English word *ball* that exhibits a high degree of overlap with one of its translation equivalents (*pelota*), but less overlap with (*balón*), an alternative translation. It could be said that all *balls* are *pelotas*, but not all *balls* can be translated into *balones*. A *balón* is typically a heavier and larger, specialized ball that is used in soccer, American football, or basketball. It would be inaccurate, for example, to translate *tennis ball* as *balón de tenis* or *baseball ball* as *balón de beisbol*, instead *pelota* would be the appropriate translation equivalent. Moreover, *ball* in English would also maintain some of its various possible meanings such as gatherings for social dancing, describing a pleasant experience, and showing competence (e.g., *to be on the ball*). In other words, it is possible for concrete words across languages to share some overlapping features, while other features may or may not overlap. In any case, the usefulness of this model is its explanatory power to capture our intuitions about similarities and differences between words across languages (Heredia & Brown, 2004). This model does an excellent job of describing some differences and similarities between words across languages. However, it is limited in the sense that it can only explain some of the findings—mainly those at the word level—and not other general findings such as the ones described in relation to the hierarchical models (Finkbeiner et al., 2004; but see Kroll & de Groot, 1997).

More recently however, Finkbeiner et al. (2004) have proposed interesting modifications to de Groot's distributed conceptual feature model. The most significant change is that semantic features, as described in Figure 3.9a–c at the conceptual level, become *senses*. Senses in this case correspond to "*bundles* of features corresponding to distinct usages" referred to as "semantic senses" (p. 8). In other words, senses could be conceived of as the number of meanings or ways in which a word could be used. For example, *house* in English is polysemous or a word with multiple meanings, with up to 14 senses (WordNet 2.1, 2005). Among some of its senses include: *a dwelling that serves as living quarters for one or more families* (e.g., *she felt she had to get out of the house*), *an official assembly having legislative powers* (e.g., *a bicameral legislature has two houses*), and *a building in which something is located*, just to name a few. Thus, according to the *sense model*, this word would be composed of 14 senses or *bundles of features*. In contrast, its Spanish translation may or may not have the same number of senses; how many senses are represented at the conceptual level by a given word would vary from language to language. Actually, inspection of *El Diccionario de La Real Academia Española* (1992) suggests that like its counterpart in English, *casa* is equally polysemous. Thus, the more semantic senses are shared between words across languages, the more identical the concepts are.

What is significant about this proposal is that it is intuitive and it is able to operationalize the contents of the conceptual system from abstract conceptual features to semantic senses that are tangible and somewhat easier to bring under experimental control. Although this model has the potential to account for the translation and priming asymmetries reported earlier (see discussion of the revised hierarchical model), more research is needed to determine its usefulness in describing bilingual memory representation. So far, the evidence for this model comes from experiments with English monolinguals under language conditions that are assumed to be analogous to L1 to L2 and L2 to L1 conditions.

Bilingual Interactive Model

The last model to be discussed is the *bilingual interactive activation model* (BIA) (Dijkstra & Van Heuven, 2002). The BIA is a network model in which different levels (e.g., features, letter, word, and language) interact and are activated in parallel or simultaneously (see Figure 3.10). Models of this sort are referred to as *connectionist* or *parallel distributed processing* (PDP) models. Although other interactive models such as the bilingual model of lexical access (Léwy & Grosjean, 2001), the self-organizing model of bilingual processing (Li & Farkas, 2002), and the competition model (Bates, Devescovi, & D'Amico, 1999) have been proposed to explain the bilingual linguistic system, the focus of this brief introduction is on BIA, mainly because it has received the most attention in the bilingual literature.

BIA is a word recognition model and its purpose is to explain how bilinguals retrieve orthographical representations from the mental lexical that correspond to a word (Dijkstra & Van Heuven, 2002). As can be seen from Figure 3.10, BIA is divided into the feature level (e.g., the letter *A* could be decomposed into a forward diagonal '/', a horizontal line '-', and a backward diagonal

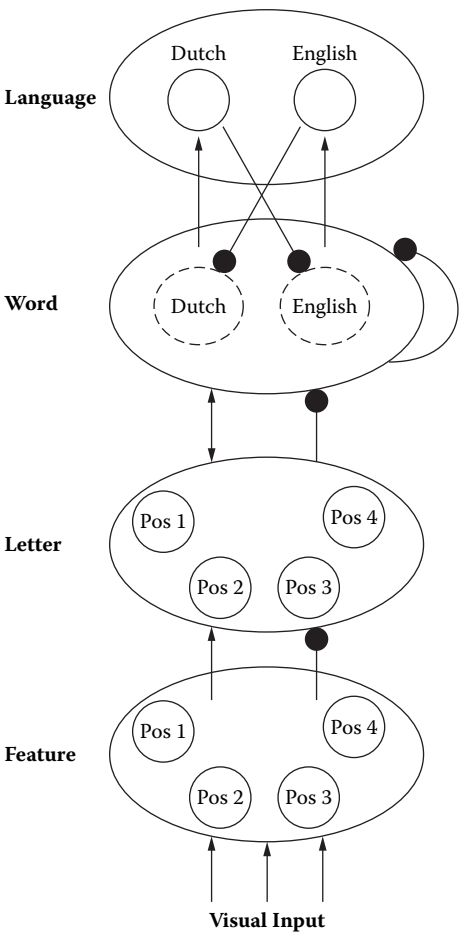

Figure 3.10 The bilingual interactive activation (adapted from Dijkstra & Van Heuven, 2002, p. 177, Figure 1).

'\'), the letter, the word, and the language level. Activation for this model is said to be *bottom-up*. This means that activation (depicted as solid arrows) for the BIA starts from the lowest level (the feature) to the highest level (the language).

Thus, according to BIA, when a string of letters (word or nonword) is presented (i.e., the visual input), features represented by the letters in the different positions (*pos 1–4* Figure 3.10) are activated. These features in turn excite letters that contain such features and at the same time inhibit or deactivate (depicted by lines with solid circles) other letters that do not share such features.

For example, the features in the second letter *A* (/ - \) of the letter string *PAN* would inhibit letters such as *O* or *C*. Moreover, letters excite words in both languages that contain the letters in the correct position and inhibit words that have letters in the wrong position. At the word level, BIA assumes two lexicons, one lexicon for each language. However, the lexicons (depicted as broken circles in Figure 3.10) are integrated across the two languages, as posed by the *interdependence or shared-memory hypothesis* discussed earlier. Next, words activate the language nodes (Dutch or English, in Figure 3.10). At the same time, words send activation back to the letter level (depicted by bidirectional solid arrows). These active words inhibit other words that should not be active (depicted by the loop with the solid circle). Simultaneously, the language node (e.g., Dutch) inhibits competing words from the other language lexicon (e.g., English; shown as diagonal lines crossing over with solid circles. According to BIA, word recognition occurs when a word's activation level surpasses a recognition threshold that depends on such factors as *word frequency* (how frequent a word occurs in the respective language) and how similar the words are across the two languages (Dijkstra & Van Heuven, 2002).

In general, BIA is a computer model that attempts to explain bilingual word recognition effects by simulations. For example, this model has been able to account for the finding that during the recognition or word retrieval of ambiguous words, bilinguals engage in multiple access. Ambiguous words, such as cross-language homographs, are words that are spelled similarly across languages but have different meanings (e.g., *PAN* in English refers to a *cooking utensil*, and *PAN* in Spanish refers to *bread*). In other words, during bilingual lexical access, the two meaning of the homograph are activated simultaneously or at once (see Gianico & Altarriba, this volume, for specific examples of lexical ambiguity). This of course is due to BIA's inherent assumption that bilingual lexical access is nonselective in nature (Dijkstra & Van Heuven, 2002).

Based on some criticisms that concern how BIA does not propose a mechanism that accounts for phonological and semantic representations, it has been updated and it is now called BIA+. A full discussion of the BIA+ is beyond the scope of the present discussion; suffice it to say that the updated version includes mechanisms to account for phonological, as well as semantic representations.

Summary and Conclusion

How do bilinguals organize their two languages in memory? The purpose of this chapter was to provide an overview of the different models that have been proposed in the bilingual memory literature, and at the same time describe some of the classic studies in bilingualism. As we have seen, bilingual memory research has come a long way—from general and at times underspecified theoretical accounts such as the *shared* vs. the *separate-memory hypotheses*, and the equally problematic, but attractive notion of *compound* vs. *coordinate bilingualism*, to clear and well-formulated models such as *bilingual dual-code theory,* and current *hierarchical models*. More important, however, has been the further development and the revision of classic bilingual models such as

de Groot's *bilingual distributed conceptual feature model* into the *sense model* that although lacking direct empirical support generates interesting and testable hypotheses. And finally, the Bilingual Interactive Activation model (BIA and BIA+) provides a general theoretical framework that could be used to generate research, and relate research findings to the predictions and assumptions of the BIA and BIA+. Again, bilingual memory has come a long way, but much more work is needed to further refine existing models in order to arrive at a fuller understanding of how bilinguals organize their two languages. How do bilinguals organize their two languages? At the present time, it seems that the hierarchical models, including de Groot's conceptual feature model, probably provide the clearest and most elegant solution to the bilingual storage problem.

List of Key Words and Concepts

Between-language, Bilingual concreteness effect, Bilingual dual-coding theory, Bilingual interactive model (BIA), Category interference, Compound bilingualism, Concept mediation model, Conceptually-driven tasks, Concreteness effect, Connectionist, Coordinate bilingualism, Data-driven tasks, Declarative memory, Distance effect, Distributed conceptual feature model, Episodic memory, Hierarchical models, Input switch, Interdependence memory hypothesis, Lag effect, Language dominance, Long-term memory (LTM), Nondeclarative memory, Parallel distributed processing (PDP), Phonemic monitoring task, Picture superiority effect, Polysemy, Priming effects, Proactive interference paradigm (PI), Procedural memory, Release from proactive interference, Repetition effect, Sense model, Shared-memory hypothesis, Short-term memory (STM), Spacing effect, Within-language, Word association model

Internet Sites Related to Bilingual Memory

Bilingual Research Journal On-line: http://brj.asu.edu/
Bilingual and Language Processing: http://www.tamiu.edu/~rheredia/bilingualism.html
Language and Speech Processing Laboratory: http://www.unine.ch/ltlp/
Models of Bilingualism: http://homepage.ntlworld.com/vivian.c/SLA/Bilingualism%20Models%20and%20Memory.htm
The Center for Research in Language: http://crl.ucsd.edu/bilingual/
Resources for Experimentation: http://www.tamiu.edu/~rheredia/links.html

Discussion Questions

1. Are there any similarities between the *coordinate-compound* bilingual distinction and current hierarchical models of bilingual memory?
2. What is the main difference between Paivio's bilingual *dual-coding theory* and the hierarchical models? Are there any similarities?
3. Compare and contrast between the *independent* and *interdependent hypotheses* of bilingual memory and discuss some of the evidence supporting each model. Finally, what is your opinion regarding these two hypotheses? Which one makes the most sense to you, and why?

4. Compare and contrast the *word association* and the *concept mediation models*. Make sure that you describe each model and its specific assumptions. What are the specific predictions regarding picture naming in L2 and translating into L2, according to these models? Finally, what can we conclude about these two models?
5. Describe the *revised hierarchical model* and suggest how this model can be tested. Finally, what are some possible problems with this model, and how would you modify this model to account for its weaknesses?
6. In relation to the *sense model* and the *distributed conceptual feature model*, what makes the *sense model* a potentially better proposal than the *distributed conceptual feature model*?
7. What makes the *bilingual interactive activation model* (BIA) a much different model than the other models described in this chapter?
8. Why are pictures remembered better than words? What model makes this prediction?
9. What is the bilingual *concreteness effect*, and how would you obtain this effect?
10. Do you have your own theory of bilingualism? If you do, state your theory in detail and suggest some ways to test it.

Suggested Research Projects

1. Choose three related articles on bilingual memory from the *Journal of Memory and Language* (formerly known as *Journal of Verbal Learning and Verbal Behavior)* or from another psychological journal. Choose the article that you like the most, and try to see if you can replicate its results by carefully following instructions from the methods section. After you finish your experiment, discuss it with your professor and present your findings to your class.
2. Please visit http://www.math.yorku.ca/SCS/Online/paivio/ and select 20 high-frequency words. Choose 10 of these words, at random, and translate them into Spanish or any other language. You should have 10 words in English and 10 in Spanish. Mix the 20 words and have your classmates study these words for about 40 seconds. Make sure that you present 1 word at a time. To do this, use available visual presentation software such as *openoffice* (download it free of charge from: www.openoffice.org) or other specialized experimental software such as *PsyScope* or other programs that can be obtained free of charge from http://www.tamiu.edu/~rheredia/materials.html. After studying the 20 words, have your classmates try to remember as many words as possible in any order. In what language were your classmates able to remember the most words? Can you explain why? What are some possible explanations? Can you explain your results in terms of some of the models described in this chapter?
3. In relation to the *sense model*, visit http://wordnet.princeton.edu/ and download the program for your particular computer platform; it can be downloaded free of charge. After you install *wordnet* find out how many senses are associated with the concept of *love*. Now, consult *El Diccionario de la Real Academia Española* or visit http://www.wordreference.com/definicion/ and enter *amor*, and estimate the various meanings or different usages of *amor*. Do you see any differences and similarities in the usage of this concept between English and Spanish? Are there any language specific aspects of this concept for Spanish and English?
4. For this project, you can use the 20 high-frequency words (10 English and 10 Spanish) from project two. First, randomize the 20 words and use a different group of participants. This

experiment should be performed in a secluded place with one participant at a time. For this experiment, have participants translate the English words into Spanish and vice versa. Do this one word at a time, and note the time taken to translate each word. You can keep track of the time by using a stopwatch or by using one of the specialized programs mentioned in project 2. Compute the average time taken to translate from English to Spanish and Spanish to English. Did you obtain the predicted translation asymmetries? Do you notice any differences? Which direction was faster to translate? How would you explain these results?

5. For this next project, follow the same procedure as the first project, but this time choose the *concreteness ratings* to obtain concrete and abstract words. The concreteness ratings provided by the norms in the Web site range from 1–7. After the selection of 20 to 30 words, go to a psychological data base (e.g., *PsychINFO or EBSCO*) and search for articles related to the *concreteness effect* to find out the criteria used to define *concrete* and *abstract* words. What did you find out? How are concrete words defined? In other words, what is the criterion used to define abstract and concrete words?

Author Notes

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References

Altarriba, J. (1992). The representation of translation equivalents in bilingual memory. In R. J. Harris (Ed). *Cognitive processing in bilinguals* (pp. 157–174). Amsterdam: Elsevier Science B.V.

Altarriba, J. (2001). Language processing and memory retrieval in Spanish-English bilinguals. *Spanish Applied Linguistics, 4,* 215–245.

Altarriba, J., & Basnight-Brown, D. M. (2007). Methodological considerations in performing semantic and translation priming experiments across languages. *Behavior Research Methods, Instruments, & Computers.*

Altarriba, J., & Bauer, L. M. (2004). The distinctiveness of emotion concepts: A comparison between emotion, abstract, and concrete words. *American Journal of Psychology, 117,* 389–410.

Altarriba, J., & Mathis, K. M. (1997). Conceptual and lexical development in second language acquisition. *Journal of Memory and Language, 36,* 550–568.

Altarriba, J., Kroll, J. F., Sholl, A., & Rayner, K. (1996). The influence of lexical and conceptual constraints on reading mixed-language sentences: Evidence from eye fixations and naming times. *Memory & Cognition, 24,* 477–492.

Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. W. Spence & J. T. Spence (Eds.), *The psychology of learning and motivation: Advances in research in theory* (Vol. 2, pp. 89–105). New York, NY: Academic Press.

Basi, R. K., Thomas, M. H., & Wang, A. Y. (1997). Bilingual generation effect: Variations in participant bilingual type and list type. *The Journal of General Psychology, 124,* 216–222.

Basnight-Brown, D. M., & Altarriba, J. (2007). Differences in semantic and translation priming across languages: The role of language direction and language dominance. *Memory & Cognition*.

Bates, E., Devescovi, A., & D'Amico, S. (1999) 'Processing complex sentences: a cross-linguistic study. *Language & Cognitive Processes, 14*, 69–123.

Caramazza, A., & Brones, I. (1980). Semantic classification by bilinguals. *Canadian Journal of Psych*ology, *34*, 77–81.

de Groot, A. M. B. (1992). Determinants of word translation. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 18,* 1001–1018.

de Groot, A. M. B., Dannenburg, L., & Van Hell, J. G. (1994). Forward and backward word translation by bilinguals. *Journal of Memory and Language, 33,* 600–629.

Dijkstra, T., & Van Heuven, W. J. B. (2002). The architecture of the bilingual word recognition system: From identification to decision. *Bilingualism: Language and Cognition*, *5*, 175–197.

Dillon, R. F., McCormack, P. D., Petrusic, W. M., Cook, G. M., & Lafleur, L. (1973). Release from proactive interference in compound and coordinate bilinguals. *Bulletin of the Psychonomic Society, 2,* 293–294.

Durgunoğlu, A. Y., & Roediger, H. L. (1987). Test differences in accessing bilingual memory. *Journal of Memory and Language, 26,* 377–391.

El Diccionario de la Real Academia Española (1992). (21st ed.). Madrid, Spain: Real Academia Española.

Ervin, S., & Osgood, C. (1954). Psycholinguistics: A survey of theory and research problems. In Osgood & T. Sebeok (Eds.), *Psycholinguistics* (pp. 139–146). Baltimore, MA: Waverly Press.

Finkbeiner, M., Forster, K. I., Nicol, J., & Nakamura, K. (2004). The role of polysemy in masked semantic and translation priming. *Journal of Memory and Language, 51,* 1–22.

Fox, E. (1996). Cross-language priming from ignored words: Evidence for a common representational system in bilinguals. *Journal of Memory and Language, 35,* 353–370.

Gekoski, W. (1980). Language acquisition context and language organization in bilinguals. *Journal of Psycholinguistic Research, 9,* 429–449.

Gerard, L., & Scarborough, D. L. (1989). Language-specific lexical access of homographs by bilinguals. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 15,* 305–315.

Glanzer, M., & Duarte, A. (1971). Repetition between and within language in free recall. *Journal of Verbal Learning and Verbal Behavior, 10,* 625–630.

Goggin, J., & Wickens, D. D. (1971). Proactive interference and language change in short-term memory. *Journal of Verbal Learning and Verbal Behavior, 10*, 453–458.

Green, D. W. (1998). Mental control of the lexico-semantic system. *Bilingualism: Language and Cognition*, *1,* 67–81.

Guttfreund, D. G. (1990). Effects of language usage on the emotional experience of Spanish-English and English-Spanish bilinguals. *Journal of Counseling and Clinical Psychology, 58,* 604–607.

Heredia, R. R. (1995). *Concreteness effects in high frequency words: A test of the revised hierarchical and the mixed models of bilingual memory representations.* Unpublished doctoral dissertation, University of California, Santa Cruz.

Heredia, R. R. (1997). Bilingual memory and hierarchical models: A case for language dominance. *Current Directions in Psychological Science, 6,* 34–39.

Heredia, R. R. (2005, October). *Hacía una teoría cognitiva sobre el intercalamiento lingüístico.* Paper presented at the XIV Congreso Internacional ALFAL (Asociación de Lingüística y Filología de América Latina). Monterrey, N. L., México.

Heredia, R. R., & Altarriba, J. (2001). Bilingual language mixing: Why do bilinguals code-switch? *Current Directions in Psychological Science, 10,* 164–168.

Heredia, R. R., & Brown, J. M. (2004). Bilingual Memory. In T. K. Bhatia, & W. C. Ritchie (Eds.), *Handbook of bilingualism* (pp. 225–249). Malden, MA: Blackwell Publishing.

Heredia, R. R., & McLaughlin, B. (1992). Bilingual memory revisited. In R. J. Harris (Ed). *Cognitive processing in bilinguals* (pp. 91–103). Amsterdam: Elsevier.

Heredia, R. R., Mendiola, K. M., Tuttle, S. J., & Greybeck, B. (2005). *Child bilingualism: A psychological analysis of code-switching* (Border Research Rep.). Laredo, TX: Texas Center for Border Economic and Enterprise Development.

Hinson, J. M., & Whitney, P. (2006). Proactive interference and item similarity in working memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 32,* 183–196.

Jiang, N., & Forster, K. I. (2001). Cross-language priming asymmetries in lexical decision and episodic recognition. *Journal of Memory and Language, 44,* 32–51.

Kirsner, K., Smith, M. C., Lockhart, R. S., & King, M. L. (1984). The bilingual lexicon: Language-specific units in an integrated network. *Journal of Verbal Learning and Verbal Behavior, 23,* 519–539.

Keatley, C., & De Gelder, B. (1992). The bilingual primed lexical decision task: Cross-language priming disappears with speeded responses. *European Journal of Cognitive Psychology, 4,* 273–292.

Keatley, C. W., Spinks, J. A., & De Gelder, B. (1994). Asymmetrical cross-language priming effects. *Memory & Cognition, 22,* 70–84.

Kolers, P. A. (1963). Interlingual associations. *Journal of Verbal Learning and Verbal Behavior, 2,* 291–300.

Kolers, P. A., & González, E. (1980). Memory for words, synonyms, and translations. *Journal of Experimental Psychology: Human Learning and Memory, 6,* 53–65.

Kroll, J. F., & de Groot, A. M. B. (1997). Lexical and conceptual memory in the bilingual: Mapping form to meaning in two languages. In A. M. B. de Groot & J. F. Kroll (Eds.), *Tutorials in bilingualism: Psycholinguistic perspectives* (pp. 169–199). Mahwah, NJ: Lawrence Erlbaum Associates.

Kroll, J. F., & Sholl, A., (1992). Lexical and conceptual memory in fluent and nonfluent bilinguals. In R. Harris (Ed.), *Cognitive processing in bilinguals* (pp. 157–174). North-Holland: Elsevier Science Publishers.

Kroll, J. F., & Stewart, E. (1994). Category interference in translation and picture naming: Evidence for asymmetric connections between bilingual memory representations. *Journal of Memory and Language, 33,* 149–174.

La Heij, W., Hooglander, A., Kerling, R., Van Der Velden, E. (1996). Nonverbal context effects in forward and backward translation: Evidence for concept mediation. *Journal of Memory and Language, 35,* 648–665.

Lederberg, A. R., & Morales, C. (1985). Code-switching by bilinguals: Evidence against a third grammar. *Journal of Psycholinguistic Research, 14,* 113–136.

Léwy, N., & Grosjean, F. (2001). *The computerized version of BIMOLA: A bilingual model of lexical access.* Manuscript in preparation, University of Neuchâtel, Switzerland.

Li, P. (1996). Spoken word recognition of code-switched words by Chinese-English bilinguals. *Journal of Memory and Language, 35,* 757–774.

Li, P. & Farkas, I. (2002) A self-organizing connectionist model of bilingual processing. In R. R. Heredia & J. Altarriba (Eds). *Bilingual sentence processing* (pp. 59-85). Amsterdam: Elsevier Science B.V.

López, M., & Young, R. K. (1974). The linguistic interdependence of bilinguals. *Journal of Experimental Psychology, 102,* 981–983.

MacNamara, J., & Kushnir, S. L. (1971). Linguistic independence of bilinguals: The input switch. *Journal of Verbal Learning and Verbal Behavior, 10,* 480–487.

McCormack, P. D. (1977). Bilingual linguistic memory: The independence-interdependence issue revisited. In P.A. Hornby (Ed.). *Bilingualism* (pp. 57–67). New York: Academic Press.

Matlin, M. W. (2005). *Cognition* (5th ed.). Hoboken, NJ: John Wiley & Sons.

Paivio, A. (1991). Dual coding theory: Retrospect and current status. *Canadian Journal of Psychology: Outstanding Contributions Series, 45,* 255–287.

Paivio, A., Clark, J., & Lambert, W. E. (1988). Bilingual dual-coding theory and semantic repetition effects on recall. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 14,* 163–172.

Paivio, A., & Desrochers, A. (1980). A dual-coding approach to bilingual memory. *Canadian Journal of Psychology, 34,* 388–399.

Paivio, A., & Lambert, W. E. (1981). Dual coding and bilingual memory. *Journal of Verbal Behavior and Verbal Learning, 20,* 532–539.

Paradis, M. (1980). Language and thought in bilinguals. In W. C. McCormack & H. J. Izzo (Eds.), *The sixth LACUS forum 1979* (pp. 420–431). Columbia, SC: Horn Beam Press.

Potter, M. C., So, K., Eckardt, V., & Feldman, L. (1984). Lexical and conceptual representation in beginning and proficient bilinguals. *Journal of Verbal Learning and Verbal Behavior, 23,* 23–38.

Repovš, G., & Baddeley, A. (2006). The multi-component model of working memory: Explorations in experimental cognitive psychology. *Neuroscience, 13*9, 5–21.

Roediger, H. L. (1991). Implicit memory: Retention without remembering. *American Psychologist, 45,* 1043–1056.

Scarborough, D. L., Gerard, L., & Cortese, C. (1984). Independence in bilingual word recognition. *Journal of Verbal Learning and Verbal Behavior, 23,* 84–99.

Schwanenflugel, P. J., & Rey, M. (1986). Interlingual semantic facilitation: Evidence for a common representational system in the bilingual lexicon. *Journal of Memory and Language, 25,* 605–618.

Schwanenflugel, P.J., Akin, C., & Luh, W.-M. (1992). Context availability and the recall of abstract and concrete words. *Memory & Cognition*, 20, 96–104.

Sebastían-Gallés, N., Echeverría, S., & Bosch, L. (2005). The influence of initial exposure on lexical representation: Comparing early and simultaneous bilinguals. *Journal of Memory and Language, 52,* 420–255.

Slamecka, N. J., & Katsaiti, L. T. (1978). The generation effect as an artifact of selective displaced rehearsal. *Journal of Memory and Language, 26,* 589–607.

Soares, C., & Grosjean, F. (1984). Bilinguals in a monolingual and a bilingual speech mode: The effect on lexical access. *Memory & Cognition, 12,* 380–386.

Vaid, J. (1988). Bilingual memory representation: A further test of dual coding theory. *Canadian Journal of Psychology, 42,* 84–90.

Weinreich, U. (1953). *Languages in contact*. New York: The Linguistic Circle of New York.

WordNet 2.1 (2005). Princeton University. Retrieved from http://wordnet.princeton.edu/

Zeelenberg, R., & Pecher, D. (2003). Evidence for long-term cross-language repetition priming in conceptual implicit memory tasks. *Journal of Memory and Language, 49,* 80–94.

II

COGNITIVE AND NEUROLOGICAL MECHANISMS

Chapter 4

The Psycholinguistics of Bilingualism

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A Brief Introduction

Throughout history humans have always asked themselves what is it that separates them from other species? What is it that makes them human? According to some theorists and researchers, it is language that sets humans apart from other species of life. It is not that other species do not have some form of communication, but rather that none has a system of grammar that is rule-governed wherein new and novel utterances can be understood and new sayings and words, for example, can be generated and learned. How do we comprehend and use language? When an individual knows more than one language, are they each stored in different ways or are some aspects of the two languages shared across both sets of representations? The current chapter will uncover some of the basic aspects of human language and specifically, how speakers of more than one language coordinate their learning, recall, and use of their languages in effective and useful ways.

To begin, *psycholinguistics* is the study of how people use, learn, and comprehend language. Psycholinguists are interested in language processing. This chapter is designed to introduce the reader to the concepts involved in the study of psycholinguistics and how they apply to the specific instance of bilingualism. In addition, this chapter will provide a survey of literature that reflects the concepts involved in the psycholinguistics of bilingualism. The latest works and other applicable works are discussed as they pertain to the issues at hand. The purpose of including these particular works is to provide current ideas and debates within this realm of research.

Levels of Analysis in Cross-Language Psycholinguistic Research

Psycholinguists use many different approaches to investigate language processing. Different levels of language processing can ultimately lead to a well-formed, unified understanding of bilingual language processing. For example, phonology, semantics, morphology, and pragmatics are aspects of language processing. These levels are parts that make up the whole of language. The levels are structured so that some require deeper processing than others. For instance, comprehending an entire sentence requires more attention and memory capacity from the individual than the process of comprehending a single sound. Within the following sections, these levels will be discussed as they relate to bilingualism.

Phonology is the study of sounds associated with language. For instance, in English, one could study the phonological differences between the pronunciation of the *c* in *cake* (which requires a hard /k/ sound) and the *c* in *cellar* (which has a soft /s/ sound.) *Semantic processing*, or semantics, is the study of the meaning of language. Take, for example, the word *cake*. English speakers learn that the word *cake* refers to a specific type of baked dessert. Psycholinguists are interested in the mental processing that occurs when an English speaker encounters the word *cake*. *Morphology* refers to the study of the smallest meaningful unit of language. These units, called *morphemes*, are not always actual words. An example is the word ending of *–ing*, which in and of itself, is not a word. However, there is a meaning associated with that ending that gives us the present progressive as in "I am eating." The *syntax* of a language is the formation of grammatically correct sentences, such as the grammatical rule in English that requires the adjective must come before the noun it describes. Speakers use *pragmatics* as a guide for language use. An example of using pragmatic information is the choice to use the term *big, bad wolf* instead of *bad, big wolf*. Both terms are grammatically correct, however, native English speakers prefer to use the first term. Another item that will be discussed is the *mental lexicon.* The mental lexicon is the mental dictionary that contains all the words a speaker knows. The following section focuses on the topic of phonology.

Phonology

Phonology is the study of the sounds associated with language. Phonology includes the rules determining different sound elements, called *phonemes*, which are the smallest units of sound that contain meaning. For example, /c/ is a meaningful sound of meaning because /c/ in *cup* is the thing that we use to drink, whereas /p/ might give *up* a different meaning such as *pup* as in *puppy*.

A recurring theme throughout this chapter is the relationship between a bilingual's two languages. Not only does this apply to the study of phonetics, it applies to other areas as well. The *language-nonselective view* is the notion that a bilingual's two languages interact with each other and, therefore, both languages can be accessed regardless of the language that is being used at the time (see Heredia's discussion of Bilingual Interactive Activation model, this volume). In other words, both languages could be accessed simultaneously. The *language-selective view* assumes that a bilingual accesses words from the language being used at a particular time, and that there is minimal, if any, influence from the bilingual's other language. Figure 4.1 provides an illustration of language access for each view.

In order to study phonology, Jared and Kroll (2001) used a naming task to identify whether bilinguals activate phonological representations in both of their languages. In this study, English-French and French-English bilinguals were asked to name words both in English and in French. Some of the English words were chosen because they had similar spelling in French, without sharing the same phonological code. The bilinguals first named a block of English words, followed

by a block of French words, and ended with another block of English words. *Blocks* are groups of stimuli (in this case, the stimuli are words).

Jared and Kroll (2001) expected that the French words would influence naming in English, which was supported by their set of experiments. Both sets of phonological codes were activated in the bilinguals, however, this depended on whether French was their first or second language, and their overall fluency in French. The language-nonselective access view was supported because the phonology of both languages was activated at the same time, thus they were interacting with one another. Language dominance and proficiency also influenced performance. Bilinguals fluent in French were slower in naming English words after being presented with a French word. The fluency in French hurt performance in English, suggesting that French phonology was being accessed and interrupted the English task.

On the other hand, Roelofs (2003) found the opposite results. Specifically, Roelofs gave Dutch-English bilinguals words to produce. That is, participants were asked to pronounce words aloud. Roelofs showed that words that share phonology across languages actually helped Dutch-English bilinguals "prepare" to pronounce words in either language. However, one could argue that these phonological effects could be due to similar spelling-to-sound codes in Dutch and English. Thus, similar sounds could help bilinguals name words faster. Marian and Spivey (2003) avoided this possible problem by not presenting words visually to their participants.

Marian and Spivey (2003, Experiment 1) asked Russian-English bilinguals to participate in an experiment conducted entirely in English to investigate phonological similarity between Russian and English. The authors recorded participants' *eye movements* to various objects that were presented. Eye movements can be measured and are used to identify the location a participant is looking. Researchers use this information to make assumptions about what a person is paying attention to. In addition to measuring eye movements, participants were asked to pick up an object from a group of objects that were presented. The objects were chosen so that the name of the target object sounded similar to the name of a competitor object. A target is a stimulus that is designed to elicit a response from a participant. It is the item of interest to the experimenter. In the no-competition control condition, one of the objects shown was the target object and the other three were filler objects. Filter objects are objects unrelated to the target object and are not expected to influence participant's response. The between-language condition included the target object in addition to an object whose name in Russian had a similar sound to the English name. This object

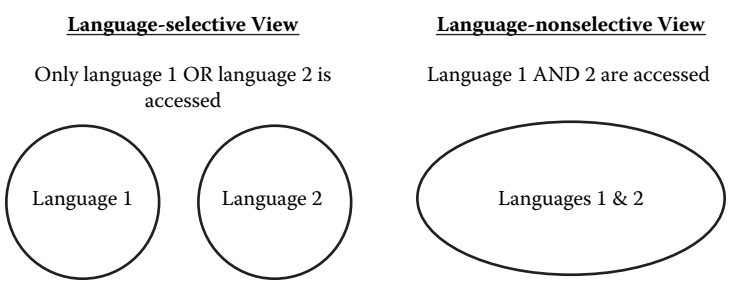

Figure 4.1 Illustrations of the language-selective and language-nonselective views of bilingual language access.

is a *between-language competitor,* due to the phonological similarity—thus the names were in phonological competition with each other. Note in the following example that the name *plug* shares the initial sound with *plat'e*. The other two objects were filler objects. In the within-language condition, a target was given along with an object that had an English name that was phonologically similar to the English name of the target object. This is referred to as a *within-language competitor* because the phonological similarity was found within the English language and not in Russian. Notice that the word *plug* shares the first sound with *plum*. The other two objects were fillers. Finally, in the simultaneous condition, a between-language competitor object, a within-language competitor object and a filler object, accompanied a target object. Following is an example from Marian and Spivey (p. 102):

target object: "plug"
within-language competitor object: "plum"
between-language competitor object: "plat'e" ("dress")

For each trial, eye movements were recorded. Then, participants were asked to pick up the target object, and then to pick up two additional nontarget objects. In other words, continuing with the example presented earlier, the participant would be instructed to pick up the "plug," followed by the "plum," and then the "dress." During the between-language competitor trials, participants fixated on the competitor object on 18% of the trials and on the control items on 7% of the trials, meaning that they looked more often at the competitor object than the control (or filler) object. These findings indicated that bilinguals experienced competition from Russian, their first language, with English. A similar pattern was found for the within-language competitor trials, indicating that participants also experienced competition within their second language. In the simultaneous condition, phonological similarity caused competition for both within- and between-language competitors. The findings supported the notion of a language-nonselective view of access because both languages were activated in a parallel fashion. Also, it seems as though phonological competition can occur for monolinguals as well as bilinguals due to the existence of within language competition.

In the second experiment (Marian & Spivey, 2003), the same design was implemented to investigate Russian-English bilinguals in an exclusively Russian experiment. In this situation, the English experiment was replicated in Russian with a stimulus list developed to mimic the English stimulus list. The following is an example of the stimuli used (Marian & Spivey, 2003, p. 105):

target object: "sharik" ("balloon")
within-language competitor object: "shapka" ("hat")
between-language competitor object: "shark"

The overall findings from this study suggested language-nonselective access, however, there seems to be less, or no phonological overlap competition from the second language. When participants were using their native language (Russian), English did not seem to affect them. However, when using English, competition from Russian was found. Although the overall results supported the activation of both languages in parallel, the findings also suggested that the strength of language proficiency may also play a role because English did not seem to affect the Russian condition. However, some believe that proficiency in a language *does not* have an effect.

Duyck, Diependaele, Drieghe, and Brysbaert (2004) suggested that phonological priming does not depend on how proficient a bilingual is in their second language. Dutch-French bilinguals participated in the experiment. Participants were presented with a *prime* (a prime word is a word designed to influence the response to a word that follows it). A prime word was followed by a *visual mask* on a computer screen. A visual mask makes it more difficult to read a word, for instance, a row of asterisks (or other random characters) can be used to mask a word. A target (or the critical) word appeared and the participants then had to identify that target word and type it on the keyboard. All of the target words were French (the second language). All of the primes were Dutch words, however, one prime type overlapped phonetically with the French target, the second prime type had overlapping spelling without phonological overlap, and the third type was an unrelated control word. This was the same procedure that was used in Brysbaert, Van Dyck, and Van de Poel (1999). The Duyck et al. (2004) results showed that when the prime word and the target word sounded similar, participants were faster to identify the target word. They found that second language proficiency did not affect phonological priming as it did in Brysbaert et al. The findings of Duyck et al.'s study provided evidence for a language-nonselective view, and perhaps stronger support for it than Brysbaert et al. and Marian and Spivey (2003) in that second language proficiency did not affect phonological overlap effects. It appears that the bilingual system, as well as the monolingual system, are nonselective in nature as posed by the Bilingual Interactive Activation model described in Heredia, this volume.

The study of phonology is only one aspect of psycholinguistics. Although phonology and phonological processing are important in the investigation of psycholinguistics, other levels of analysis are also integral to language processing. In addition to sound information, semantic, or meaning information is necessary for producing and understanding language. In comparison, semantic processing is a deeper level of analysis than phonological processing. The next section delves into a discussion of findings in the bilingual literature regarding mental lexicons and semantic processing.

Semantic Processing

The *mental lexicon* is the collection of words associated with a language. A lexicon is typically considered a mental "dictionary." Having two lexicons would refer to having two collections of words, each associated with one particular language. A bilingual's *L1* refers to their first, or dominant language. The *L2* is a bilingual's second, or less dominant language. *L1* and *L2* are often used to refer to the two lexicons of the languages that a bilingual uses. The lexicon reflects the *orthography*, or spelling of language and also the *semantics*, or meaning of language. Models that have been developed to illustrate how two languages function in one person. (For additional reviews of the research regarding the bilingual lexicon, see Kroll & de Groot, 1997, and Schreuder & Weltens, 1993.)

When discussing bilingualism, one of the major issues that researchers examine is whether there are one or two lexicons. In other words, does all of the lexical information that a bilingual has, regardless of language, belong to one system, or are the languages separated into two independent lexicons? For instance, in a Spanish-English bilingual, there are two lexical entries (i.e., words) that refer to dog, namely "dog" and the Spanish translation "perro." In addition to the lexicon or lexicons, there is also the matter of semantic processing, specifically, the conceptual store. The *conceptual store* refers to concepts that are held in memory, for instance, the concept of a dog. A dog has four legs, has fur, barks, and can be a loyal pet. The concept of a dog does

not include the lexical entry *dog* because the lexical entry or the label would actually be in the bilingual's lexicon (see also Heredia, this volume).

Kroll and de Groot (1997) reviewed and discussed the *Revised Hierarchical Model* (see Heredia, this volume, for the figure that corresponds to this model) developed by Kroll and Stewart (1994). This model suggests that there are two lexicons that are connected to a single conceptual store. Within this model, the first language, or L1 lexicon, is larger, due to the fact that it was learned first and therefore more likely to contain more entries than the smaller second language, or L2 lexicon. In addition to the conceptual store and the two lexicons, the model also contains *lexical links* and *conceptual links*. There are two conceptual links that connect the conceptual store. A strong conceptual link connects the conceptual store to the L1 lexicon. This is a strong link because it is assumed that the L1 is stronger and therefore the connection will be strong. Another, weaker link connects the conceptual store to the smaller L2 lexicon. Again, the notion here is that the L2 is the weaker language, so the connection from the conceptual store to the L2 lexicon will also be weaker. These conceptual links can connect in either direction; the connections can link *from* or *to* the conceptual store or the lexicons. This means that a concept in memory can elicit a lexical entry and a lexical entry can elicit its conceptual counterpart in memory. For example, when a bilingual encounters the object "table" there is a stronger link from the concept of "table" to the lexical entry in L1 than to the lexical entry in L2.

There are two lexical links, one that links the L2 lexicon to the L1 lexicon, and one that connects the L1 lexicon to the L2 lexicon. The two lexical links in this model are unidirectional, meaning that the links only connect the lexicons in one direction. There is a strong link *from* the L2 lexicon *to* the L1 lexicon because when a bilingual first learns a second language, he or she often relies on linking the new L2 word to a familiar L1 word, thus this connection becomes a strong one. On the other hand, it is rare that a bilingual will rely on the L2 lexicon when using the L1 lexicon; therefore, the connection *from* the L1 *to* the L2 lexicon will be comparatively weaker. Let's say a bilingual speaker's L1 is Spanish and L2 is English. When encountering the word *table* the English word would also activate the Spanish word because English is the weaker language. On the other hand, encountering the word *mesa* may not even lead to the activation of the translation *table* because L1 is stronger.

However, not all researchers have found evidence that supports Kroll and Stewart (1994). According to Namei (2004), past research has argued that the L1 lexicon is organized based on semantic information, while the L2 lexicon is organized based on phonological information or form-based information. In Namei's study, this idea was investigated with Persian-Swedish bilinguals using a *word association* task. Researchers expect that a word association task elicits a word that is semantically related to the original word given to the participant. However, it is also possible that the word association task elicits a word that is phonologically related to the original word given. Participants were tested using a word association task in both languages. Namei investigated the occurrence of clang associations. Simply stated, these *clang associations* are word associations based on phonological overlap between the given word and the associated word. Typically, researchers are interested in the semantic associations rather than phonological associations. For instance, in English, a clang response would be responding to the word *light* with the word *height* or *sprite*. The results showed that regardless of how advanced the speaker was, clang associations did occur. Typically, this type of association has been thought to occur based on word knowledge; the less word knowledge, the more likely one is to produce a clang association. However, Namei suggested that people learn new words throughout their lifetime in any language they speak, and that phonological associations will occur no matter how advanced a speaker is if they happen to be unfamiliar with a particular word. Therefore, the L1 and L2 lexicons are not necessarily organized

in different ways, but rather individual words are at different stages of word learning. Kroll and Stewart's model does not make a distinction between a semantically-based L1 and a phonologically-based L2.

The following section is devoted to discussing morphological processing in bilinguals. A morpheme is the smallest unit of language that has meaning. For instance, when we talk about morphology we are talking about how the past tense is constructed in English by adding *–ed* to end of the verb. Adding *–ed* to *walk* changes the meaning from the present tense of *walk* to the past tense: *walked*. These elements give meaning to language, although not necessarily words in their own right.

Morphology and the Study of Form

Morphology is the system of word-forming elements and processes in language. A *morpheme* is the smallest *meaningful* unit in language, and these morphemes form word units in language. There are several aspects of morphology that will be discussed in this section. The first is the role of word frequency and number of morphemes within a word. The second involves verb tense formation will be described. Finally, morphological gender will be addressed as well.

Word frequency measures the occurrence of a particular word in a language. Lehtonen and Laine (2003) investigated the role of word frequency in morphological processing by testing monolingual Finnish speakers and bilingual Finnish-Swedish speakers. The experimenters presented words of varying frequency in Finnish. The participants performed a lexical decision task in which they had to decide if letter strings that appeared on a computer screen were real words. In particular, the authors were interested in what method or methods would be used in recognizing the words. For instance, would the participants use a whole word approach to recognize the whole words, or recognition based on morphology or parts of the word. The list of words presented to the participants included words with only one morpheme and inflected nouns.

Inflections are morphemes that are added to a stem word that do not change the meaning of the stem word. For instance, in English, if you add an *s* at the end of the word *car* you create the word *cars,* but the word still refers to the object conveyed by the word *car*. In other words, *car* and *cars* do not have different meanings—the only difference between these two words is that *cars* refers to more than one *car*. The dictionary would not have a separate entry for the word *cars*. For comparison purposes, *derivational morphemes* are morphemes that can change the meaning of a word. In English, when you add the ending *–er* to the word *camp* you get the word *camper*. The word *camp* does not refer to the same thing as the word *camper*. *Camp* refers to a location or to a verb, and the word *camper* is a noun that can refer to a person that is camping or to a vehicle used for camping. Therefore, the words *camp* and *camper* are two different words that would have two different entries in the dictionary. The Lehtonen and Laine (2003) study focused on inflectional nouns.

The bilinguals were using a morphemic-based recognition process in which the parts of the words were helping the recognition of the word rather than using whole word information to recognize the words. The authors argued that this might be due to the bilinguals having less exposure to these words as compared to their monolingual counterparts. The authors also suggested that because the bilinguals were slower overall, that the words were less frequent overall (as compared to the monolinguals) when you take both languages into account.

Another type of morphological relationship is the relationship between regular and irregular forms. de Diego Balaguer, Costa, Sebastián-Galles, Juncadella, and Caramazza (2004) tested two

Spanish-Catalan bilinguals suffering from agrammatic Broca's aphasia. *Broca's aphasia* occurs from brain damage that affects Broca's area, which is related to language processing. Broca's aphasia is characterized by nonfluent speech patterns, although the patient's ability to understand spoken language remains intact. In this study, the aphasic patients were asked to produce verb forms: both regular and irregular forms in Spanish and Catalan. Each trial of the morphological transformation task consisted of the onset of a sentence containing either the present tense or the past tense of the verb of interest. Then, the patient was prompted to verbalize the tense that was not presented. The following is an example translated into English (de Diego Balaguer et al., 2004, p. 216): Yesterday I ate, today I ____. Then the patient would have to respond with *eat*. In English, the verb *to eat* is *irregular* because the past tense form does not follow the grammatical rules for past tense formation. A regular English verb formation would be *to jump* in which the present tense is *I jump* and the past tense is *I jumped* which follows regular English grammatical rules.

The number of correct responses in each category was recorded for the patients tested with the morphological transformation task. The patients made more correct responses for the regular verbs than the irregular verbs in Spanish and Catalan. The irregular verb transformations were more difficult for the aphasic patients. The results challenge the notion that agrammatic speech is always associated with poor performance with regular verb forms. Also, because the results were similar for both languages, the results suggested that the brain tissue required for processing resides in similar areas for both languages. This supports the idea of language-nonselective access in which languages are not independent from each other.

Gender is a morphological aspect of many languages, such as Serbo-Croatian, German, Spanish, Russian, Italian, and French. The effects of grammatical gender on other cognitive processes will be discussed later in this chapter. Most commonly, the gender system within a language includes *feminine* and *masculine* genders. It may also be the case that a *neuter* gender is used. In many cases, certain word endings are mapped onto a particular gender. For instance, in Spanish, if a word ends with an *a*, odds are that the word is feminine. Conversely, if the word ends with an *o*, your best guess is that the word is masculine. The gender of a word provides meaning. For instance, the gender of the word may affect which verb form or adjective is used. In addition, it could provide information on the gender of a person or an animal. However, it is not always the case that the gender of a word is related to the sex of a person or object. In other words, a word that refers to a male human being is not necessarily a masculine word. In this case, the gender is simply a grammatical marker that has nothing to do with meaning (e.g., the Spanish word for hand, *la mano*).

Scheutz and Eberhard (2004) investigated the role of morphological gender on bilingual sentence processing. They presented English monolinguals and German-English bilinguals with English sentences. In German, the ending *–er* is a masculine word ending. Each sentence contained a noun that referred to a human being. All of these nouns ended with the letters *–er*. The sentence also contained either *himself* or *herself*, so that the person in the sentence was designated as male or female. The following is an example from Scheutz and Eberhard (2004, p. 567) sentences:

> The hunter hurt herself after falling out of a tree.
> Did the hunter get hurt while climbing the tree?

Are certain nouns typically thought of as referring to a male individual or a female individual? It may be the case that *hunter* typically refers to a male individual. The rating data showed a slight difference between the English group and the German-English group. There was a tendency for

the German-English group to rate the nouns as more masculine. However, the difference was not statistically significant. It is possible that the *–er* endings of the nouns biased the German-English bilinguals to rate the words as more masculine.

Morphology can clue people into a word's part of speech (i.e., verb, noun, adjective, and adverb). In addition to morphological cues, language structure also sheds light upon word type. Syntax provides meaning to language by giving readers and speakers structural information that in turn may provide word meanings and word type.

Syntax

Syntax describes the structure of language. Syntax is the domain of language that pertains to the grammatical arrangement of words in a sentence. Simply stated, syntax is the term used to describe word order within a phrase or sentence. For example, the English language is very strict on word order, and it always follows the pattern of subject, verb, object (SVO). For instance, an English speaker would say, "I want an apple," whereas other languages such as Spanish rely more on morphology, for example, "Quiero una manzana," for "I want an apple." This does not require the *yo* (which translates to *I*) because the information is provided by the conjugation of the verb. One question researchers have asked is if the syntactic system in bilinguals is separated based on language (Deuchar & Quay, 1998; Hartsuiker, Pickering, & Veltkamp, 2004). This is similar to the question posed by researchers regarding the mental lexicon.

Hoover and Dwivedi (1998) studied highly proficient English-French bilinguals. The authors divided this group based on reading speed—faster or slower readers. Native French speakers were also tested and compared to the bilingual groups. The participants were given sentence pairs to read followed by a comprehension question. The first sentence was a context sentence and the second sentence—the sentence of interest to the researchers—was one of four types of sentences. Following is a list of the sentences of interest. A *causative* sentence is one in which the subject of the sentence is performing the verb in some way—the subject is the cause of the action. These sentences differ in syntactic structure from one another. *Clitics* are pronouns that precede the verb in a sentence. Clitic sentences are not present in the English language. The following are examples of these sentence types and their verbatim translations (Hoover & Dwivedi, 1998, p. 9):

Context sentence:

Serge s'achetait fréquemment un bon vin rouge.
Serge would often buy a good red wine.

Target: causative, no clitic:
Il faisait tranquillement goûter le vin avec son fromage préféré.
He had the wine be tasted quietly with his favorite cheese.

Target: causative with clitic
Il le faisait tranquillement goûter avec son fromage doux préféré.
He had it be tasted quietly with his favorite mild cheese.

Target: non-causative, no clitic
Il aimait tranquillement goûter le vin avec son fromage préféré.
He loved to taste the wine quietly with his favorite cheese.
Target: non-causative with clitic

Il aimait tranquillement le goûter avec son fromage doux préféré.
He loved to taste it quietly with his favorite mild cheese.

The time it took to read each word in the sentence and the answer to the comprehension questions were recorded. There were no differences between the groups based on reading speed and comprehension; therefore, each group (faster English-French readers, slower English-French readers, and native French readers) had similar levels of proficiency in French.

Native French readers and the English-French readers needed more processing time for the verb when it appeared in a causative sentence with a clitic. When the experimenters compared the faster and slower English-French readers, the slower readers took more time to process the end of the sentences than faster readers when there was a clitic in the sentence. The sentences with clitics were more difficult for the slower English-French bilinguals than the faster readers. It is likely that slower English-French bilinguals may have been influenced by English syntax because they are less proficient in French than the faster English-French bilinguals. Thus, the influence of first language syntax may be based on overall proficiency in the second language.

Dussias (2003) tested monolinguals and bilinguals in a study of syntactic ambiguity resolution. In this study, readers were presented with sentences that were ambiguous, such as (Dussias, p. 541):

Peter fell in love with the daughter of the psychologist who studied in California.

In this sentence, two different interpretations are possible. For instance, the daughter could have been the one to study in California, or, on the other hand, it could have been the psychologist who studied in California. This is a syntactically ambiguous sentence. In Dussias's second experiment, Spanish monolinguals, L1 Spanish- L2 English bilinguals and L1 English-L2 Spanish bilinguals participated in a reading task. Spanish sentences were created so that they were syntactically ambiguous. The way that Spanish readers are able to understand if the possessive *su* refers to *his* or *her* is to use the surrounding context. At times, when *su* is encountered, it is ambiguous until context allows for clarification.

All participants saw sentences from each condition, although no participants saw two sentences about the same subject. *Low attachment* means that the ambiguity of the sentence is not as easily remedied compared to other sentences in which attachment is high. *High attachment* means that speakers can easily disambiguate the sentence. Low attachment forced readers to attach *con su esposo* with *la maestra* because *esposo* is the masculine form for the word spouse, and *maestra* is the feminine form of teacher. Therefore, it is most likely that a female is married to a male. Dussias expected that monolingual Spanish speakers would read this type of sentence slower than the other types. Spanish speakers would usually attach *su esposo* with a noun before *la maestra* (in other words, they would most likely attach it to the noun location of *al cuñado*).

Four different conditions were created for the experiment. The following sentence is an example (Dussias, 2003, p. 547):

El perro mordió al cuñado de la maestra / que vivió en Chile / con su esposo.
The dog bit the brother-in-law of the teacher who lived in Chile with his/her husband.

An example of the second condition (high attachment) is found here:

El perro mordió a la cuñada del maestro / que vivió en Chile / con su esposo.
The dog bit the sister-in-law of the teacher who lived in Chile with his/her husband.

The second condition forced participants to attach *su esposo* (her husband) with *la cuñada* (the sister-in-law) in the sentence. Again, this is because it is most likely that the male *esposo* is married to the female *cuñada*. Conditions three and four were control conditions. In the third condition, *la cuñada* and *la maestra* were paired in the same sentence.

El perro mordió a la cuñada de la maestra / que vivió en Chile / con su esposo.
The dog bit the sister-in-law of the teacher who lived in Chile with his/her husband.

In the fourth condition, the possessive phrase was removed from the sentence.

El perro mordió a la maestra / que vivió en Chile / con su esposo.
The dog bit the teacher who lived in Chile with his/her husband.

Each sentence was divided into three parts. The slashes in the previous sentences indicate where each sentence was divided. Participants were asked to read quickly, but accurately. When the participants finished reading a particular part of the sentence, they pressed a key to go to the next segment. The results suggested that monolingual Spanish speakers took longer to read sentences that favored low attachment. This finding was expected. The reading times for the L1 English-L2 Spanish readers did not indicate a significant difference in reading times between the low attachment sentences and the high attachment sentences. However, those bilinguals were generally faster in the low attachment condition. The L1 Spanish-L2 English readers were slower to read high attachment sentences than low attachment sentences, which was the opposite pattern of the monolingual Spanish speakers. Dussias (2003) suggested that bilinguals may face processing constraints. Bilinguals may use the local attachment (i.e., the high attachment) to save time and resources. In a way, this explanation is based more on capacity demands than on language proficiency.

The next section deals with the deepest level of language processing. Pragmatics and discourse involve issues such as social environment and conversational practices. Often, different cultures (therefore, different languages) use varying rules for utilizing language in specific contexts.

Pragmatics and Discourse in Comparative Psycholinguistics

Pragmatics describes the way that people use language in a social setting. When a speaker is bilingual, the languages that are spoken may have different pragmatic rules (see Naremore, 1985, for a review). It may be the case that an L2 learner may appear less proficient because certain pragmatic rules have not been learned.

Silva (2000) studied the pragmatic differences between English and Portuguese. The specific exemplar used in this study was the English term *Why don't you?* which is meant to be a polite suggestion, such as *Why don't you come over?* (Silva, 2000, p. 163). However, the term does not mean the same thing when translated into Portuguese.

Portuguese-dominant and English-dominant bilinguals had to judge the correctness of a particular item. Participants were read a description of a social situation and then asked to decide whether the request or suggestion in the situation was appropriate. Silva suggested that time spent in America would affect judgments from native Portuguese speakers, and time spent in Brazil would affect judgments from native English speakers.

Unlike native Portuguese speakers, Americans who did not live in Brazil for an extended period of time, tended to judge the phrase *Why don't you?* as appropriate. Silva (2000) suggested that these Americans may be accidentally using impolite statements in particular social situations. In other words, although these Americans were proficient in Portuguese, they had not grasped some of the pragmatic rules that accompany native proficiency in Portuguese.

Americans who spent a longer time in Brazil, and in fact were living in Brazil at the time of the study, performed more like native Brazilians on the judgment task. Not only did these Americans have a longer exposure to Brazilian customs, but they also were in the environment in which they would use Portuguese on a daily basis. The results also suggested that Brazilians living in the United States for less than a year performed as Brazilians in Brazil. Brazilians living a longer time in the United States differed from Brazilians in Brazil. In other words, over time, the pragmatics of the particular culture that one is living in permeates into everyday language use.

On a cultural note, there was one situation in which all Brazilians responded similarly regardless of where they were residing at the time. Silva (2000) suggested that specific social situations may be so ingrained in culture, that the pragmatic and social implications of that situation go unchanged over time. In other words, there may be limits to how proficient a bilingual can be in his or her L2 based upon the strength of the sociocultural context. Aside from a global context, such as sociocultural influences, the context of sentences plays a role in lexical access and other language processing. In the next section, language in context will be discussed as it pertains to bilingualism.

Language in Context

In the following section, the role of context will be discussed in terms of constraints in sentence processing and lexical ambiguity. The contextual information found in a sentence or surrounding text can assist the reader. In a sense, the reader knows what to expect from the information that has already been processed. This notion is discussed in terms of bilingualism. In addition, this section addresses the processing of ambiguous words (i.e., the study of lexical ambiguity). Typically, readers are able to disambiguate a word if it has more than one meaning (within a language, these words are called *homographs*). This type of ambiguity can also occur across languages. In order for bilinguals to interpret the intended meaning of an ambiguous word, they may use the surrounding context (e.g., the language context) to aid in comprehension.

Constraints in Bilingual Sentence Processing

Sentence processing includes both lexical processing and conceptual processing in addition to providing a context in which readers can access the appropriate meanings of words and phrases (see Altarriba & Gianico, 2002 for a review). In order to investigate the nature of the L1 and L2 relationship, researchers have provided bilingual participants with sentence processing tasks (e.g.,

Altarriba, Kroll, Sholl, & Rayner, 1996; Hernandez, Bates, & Avila, 1994). The results of these tasks then provide information on the relationship between a bilingual's two languages.

In a series of studies conducted by Altarriba et al. (1996), Spanish-English bilinguals who were equally fluent readers of both languages silently read sentences such as, "She took the cake out of the warm oven," that were either in one language or in two languages. That is, either the entire sentence appeared in a given language (e.g., English), or, the sentence frame appeared in a language while the final word in the sentence appeared in the opposite language (e.g., Spanish: *horno*). Sentences of low constraint such as, "She went to the store to buy a new oven," were also included in which a variety of final completion words was possible. Eye movements were monitored using an eye tracking apparatus. The results revealed that when bilinguals are reading in a specific language and a sentence builds up a particular expectancy for a specific word, that word is expected in a language that *matches* the entire text. The presentation of a translation causes the bilingual to further examine that foreign word as evidenced by longer fixation times. When the sentence is not that highly constrained, a word in either language seems not to disrupt processing. In a second experiment, the same sentences were used as in the first experiment and were presented visually, one word at a time using the rapid serial visual presentation (RSVP) procedures. The participants' task was to name the capitalized target word in each sentence. The pattern of naming latencies revealed the same results as those reported for the eye movement data.

It appears, therefore, that in terms of bilingual language processing and bilingual memory, that the languages are processed separately when expectations are strongly built up in a single language. When the conceptual information that a text or a sentence implies is not strongly constrained, either language can provide a meaningful conclusion in processing. Bilinguals can process one language separately from another and can build expectations based on processing in a single language mode, but they can also easily process information across languages in less constrained settings, for example, in casual conversations. What might occur when a bilingual encounters a single word that has two different meanings across languages? The following section will address this question with a focus on the research findings that related to the issue of language ambiguity.

Lexical Ambiguity across Languages

There are instances in which a word has the same spelling, but different meanings, across languages. This lexical ambiguity often refers to the term *interlingual homograph*. One such example of an interlingual homograph is the word *pie* which refers to a baked dessert in English, but means *foot* in Spanish. Thus, if you presented Spanish-English bilinguals with the word *pie* written on an index card, they may question which language you were presenting them with. Often, in conversation and reading, the surrounded context helps determine the correct meaning. Research on the topic of bilingual lexical ambiguity has been reviewed by Altarriba and Gianico (2003).

There are two main, opposing theoretical approaches in the investigation of ambiguity resolution across languages as discussed in other realms of bilingual language processing. These two approaches are the language-selective view and the language-nonselective view.

Language-selective view. The language-selective view predicts that the other language would not affect processing words in one language. Greenberg and Saint-Aubin (2004) investigated English-French bilinguals in a set of experiments. For their first experiment, one group of bilinguals was dominant in English and the other group was dominant in French. A monolingual English group was used as a control. The authors chose to use the words *or* and *pour* in English and French texts

to investigate interlingual homograph access (in English, *pour* means to dispense or to discharge; in French, it is equivalent to the English word *for*). These words were chosen because they are both interlingual homographs; however the words differ in frequency across the two languages. In English, the word *or* is more frequently encountered than the word *pour*; on the other hand, *pour* in French is more frequent than the word *or*. The participants were given passages that included *or* and *pour* written in English or French. While they read the passages, the participants crossed off every *r* that they came across (notice that *or* and *pour* both end in the letter *r*). This is called a *letter detection task*. When participants were reading the English passage, bilinguals failed to detect the *r* in the high frequency English word *or* more often than in the low frequency English word *pour*. The high frequency words are encountered very often, so that people skipped over the *r*. The results were similar for the English monolinguals. The pattern for the French text also showed a frequency effect. The bilinguals failed to detect the *r* in the high frequency French word *pour* more often than in the low frequency French word *or*. The authors argued that one alternative way to describe their data was with the language-selective view that demonstrates an advantage in accessing the meaning that corresponds to the language of the context.

However, differences between the English-dominant and French-dominant bilinguals were found. The English-dominant bilinguals failed to detect *r* in *or* in the French passage more often than the French-dominant bilinguals. Therefore, being strongly proficient in English made it difficult for bilinguals to detect *r* in *or* (*or* is a high frequency English word) when the language of the text was in French. This finding supported the language-nonselective view in contrast to the general findings of the contextually-driven access of meaning. That is, participants were able to access both of their languages although context may have pointed toward only one language.

Language-Nonselective View

De Groot, Delmaar, and Lupker (2000) investigated interlingual homograph processing in Dutch-English bilinguals. De Groot et al. (2000) described the *Bilingual Interactive Activation (BIA)* model as a model of language-nonselective access. The BIA model is a model that represents an integrated lexicon (meaning that a bilingual does not have a separate lexicon for the two different languages). In other words, the two languages interact and affect each other during language processing. The authors used a translation task in which participants had to translate words from one language to another and a lexical decision task. Again, a *lexical decision task* is a task in which participants have to decide if a string of letters forms a real word or not in a particular language. To create a nonword, one letter of a real word, such as *grit* is changed so that it becomes a nonword, such as *glit*. In another example, the word *blot* could be changed to the nonword *blit*. In the case of bilingual lexical decision, at times the bilinguals are asked to decide if a string of letters is a real word in one of their languages. In this study, the bilinguals were dominant in Dutch, although the participants were highly proficient in English.

In the translation task, the participants had to decide whether two words were translations of each other or not. The interlingual homograph was either the first or the second word in a translation pair. For instance, the English word *angel* is spelled the same as the Dutch word for *sting*. The word *angel* would be the interlingual homograph that was presented to the participants. Participants were given language specific instructions, either in Dutch or in English. The data showed that participants were slowed down when an interlingual homograph was part of the pair. De Groot et al. (2000) concluded that the participants were slowed because they were accessing both meanings of the interlingual homograph—both the Dutch and English meanings. The results

revealed that both languages were accessed simultaneously, which suggests that the access of word meaning is language-nonselective.

In the next section, the production of language will be discussed. This includes the processes and effects that occur when people are producing language. Specifically, the section will be exploring the production of language for bilinguals.

The Production of Language

According to Carroll (2004, p. 187) the elements of speech production include the following: conceptualizing a thought to be expressed, formulating a linguistic plan, articulating the plan, and monitoring one's speech (see Wei, 2002, for a review and discussion of the bilingual speech production process).

In producing speech, there is a possibility of error, whether it is due to a lack of language proficiency or to a minor memory lapse. The *tip-of-the-tongue* (TOT) phenomenon has been demonstrated in both the monolingual and bilingual literature. TOT is the instance when, although the person knows the name of a particular item or person, that information is temporarily unavailable. In some cases, having a word being on the "tip of your tongue" can be a frustrating experience. Gollan, Bonanni, and Montoya (2005) collected TOT data from monolingual and bilingual participants in a name elicitation task and in a picture naming task. Spanish-English bilinguals and English monolinguals completed a task in which they had to answer questions about famous people and former teachers. The entire experiment was conducted in English. Sample questions from Gollan et al. (2005, p. 282) included:

> Who was the female star in *Anaconda* and *Selena*?
> Who was your eighth-grade science teacher?

TOT rates were 36% for famous names, 30% for former teachers, and 28% for objects. Overall, bilinguals and monolinguals did not differ on how often a TOT occurred. However, more bilinguals had TOTs for object names than monolingual participants. These results were most likely due to that fact that, for bilinguals, the famous people and teachers had only one name associated with each, while the objects had both a Spanish name and an English name. It was possible that the Spanish words for the objects interfered with the production of the English names of the objects. Thus, both languages were accessed even in the English-only experiment. This is support for the language-nonselective view.

In Hermans, Bongaerts, DeBot, and Schreuder's (1998) study, Dutch-English bilinguals named target objects in their second, weaker language (English). They experienced activation in their first language, making the naming task difficult. The results showed that phonologically related words facilitated object naming regardless of when the word was presented. In addition, semantically related words interfered with naming latencies; however, significant interference was *only* found when words phonologically related to the Dutch translations of the objects were presented simultaneously with the picture. In other words, the first language (Dutch) was being activated while participants were only using English. Thus, cross-language phonological overlap caused interference in producing English words.

In their review, Costa, Santesteban, and Caño (2005) concluded that bilinguals are faster in naming pictures of objects when the names of those objects are cognates (words that overlap in

orthography across languages and typically share the same meaning, as in the English *trophy* and the Spanish *trofeo*. The authors argued that this facilitation is due to the interaction between the lexical representations of the cognates and the sublexical phonological representations of the cognates. It seems as though cross-language phonological overlap plays an important role in bilingual speech production (e.g., Costa, Colomé, Gómez, & Sebastián-Gallés, 2003). According to Costa et al.'s (2003) data, there was evidence for cross-language interference for speech production in L2.

Cross-language interference is indicative of a bilingual's activation of both L1 and L2 during a particular task. In some cases, this dual activation may lead to language switching within a conversation. Code-switching will be discussed next in detail, as it applies to language activation and processing cost.

Code-Switching and Its Implications

Code-switching or language switching occurs often in bilinguals. *Code-switching* occurs when a bilingual person is speaking in one language and then switches to his or her other language. The following example of code-switching is taken from Heredia and Altarriba (2001, p. 164):

> Dame una hamburgesa sin LETTUCE por favor.
> *Give me a hamburger without lettuce please.*

Heredia and Altarriba (2001) addressed the reasons that a bilingual would code-switch. One reason that bilinguals code-switch could be to compensate for limited language proficiency. It may be the case that the bilingual is weaker in one language and must switch to the other in order to continue the dialogue. However, there are problems with this lack of proficiency view. First of all, the idea that code-switching is due to a failure to retrieve the correct word may not be the case. In other words, when a bilingual switches to another language, it does not necessarily mean that the word could not be remembered in the original language. Limited proficiency also cannot explain why code-switches are influenced by grammar. In cases of code-switching, the sentence continues to follow the grammatical structure of the language originally used at the beginning of the utterance. That is, although a "foreign" word is spoken, the sentence structure does not change. Another important point is that language proficiency is not well defined in the first place. There are many attempts at defining language proficiency within the psycholinguistic literature, but no consensus has been reached regarding the method of measuring a person's language ability, due to the many areas involved in psycholinguistic processes (i.e., reading comprehension, spoken comprehension, written comprehension, dominance and context of language use). Finally, Heredia and Altarriba (2001) also pointed out that bilinguals use code-switching as a means of improving communication with other bilinguals. For instance, a word might be "better" in one language than another. Take the example of *cariño*. This Spanish word has a connotation of "liking." However, many Spanish-English bilinguals attest that *cariño* does not have a single English equivalent (Altarriba, 2003). Therefore, if two Spanish-English bilinguals are speaking in English, and then use this Spanish word, it provides a much richer and deeper understanding than a weakly corresponding English word. Chan (2004) argued that code-switching is a "textualization cue" that signals parts that need to be interpreted differently from the rest of the conversation.

Aside from the reasons why code-switching occurs, many researchers have asked whether or not code-switching is a time-consuming process. Does switching between languages require extra time processing? In Kolers's (1966) preliminary work, it was found that it takes longer to read

mixed-language sentences than monolingual sentences. One could assume that code-switching takes time; this additional time is called *cost*. In another early work, Macnamara and Kushnir (1971) developed the idea of the *two switch mechanism* implies two separate lexicons. The two switch mechanism determines which mental lexicon is "on" or "off" for bilingual speakers during processing. It takes time to turn one lexicon "off" then turn another lexicon "on." Both languages cannot be "on" at the same time; therefore, a mixed-language sentence would take longer to process. The question of time cost in code-switching continues to be studied.

More recently, Meuter and Allport (1999) investigated code-switch cost. According to Meuter and Allport, there is a processing cost in switching languages, in other words, switching languages takes time to process and uses up cognitive resources, thus the cost in this case is time. They expected that their results would support the *relative strength hypothesis*, which means that the cost associated with code-switching is dependent of the relative strength of each language. When a bilingual is said to switch from L1 to L2, they had been using the L1, but then respond in L2. According to the relative strength hypothesis, when switching from the L2 to the L1, bilinguals have had to suppress their L1. This suppression of L1 continues through to the initial processing of going back to using L1, thus delaying the L1 response. The suppression of L2 is not as strong, since the L2 is the weaker language and does not require much effort to suppress. Therefore, switching from L1 to L2 switch should not be delayed. The relative strength hypothesis predicts that bilinguals will have a more difficult time suppressing their L1 because their proficiency is greater than it is in L2. Thus, the effort required to suppress the stronger language will also make it more difficult for the bilingual to switch back to it, because so much effort was used to ignore it. Relative strength of the L1 compared to the L2 is the cornerstone of this hypothesis.

In order to test this hypothesis, Meuter and Allport (1999) presented bilinguals (English was either L1 or L2) with a number-naming task. Participants were shown Arabic numerals and were required to name those numerals in one of their two languages. For example, during one trial in the experiment, a Spanish-English bilingual would respond to a 2 with "two" or for another trial would respond to a 2 with "dos" (i.e., the Spanish pronunciation). The participants included those whose non-English language was French, German, Italian, Portuguese, or Spanish. A switch trial is a trial in which the bilingual had to switch from one language to another.

A nonswitch trial means that the bilingual responded in the same language twice in a row. See the previous Figure 4.2 for an illustration of these two types of trials.

Overall, reaction times for switch trials were slower than for nonswitch trials. Thus, this confirms the idea of a "cost" associated with switching languages. However, on switch trials, participants were slower in their L1 than their L2. An L2 to L1 switch was consistently *slower* than an L1

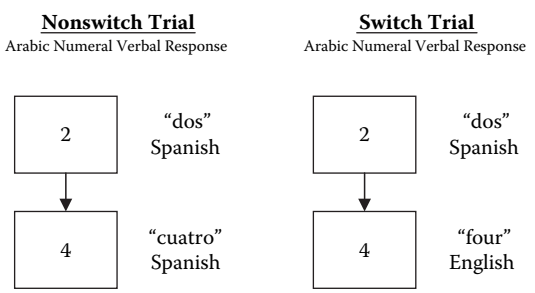

Figure 4.2 Switch trials and nonswitch trials adapted from Meuter and Allport (1999).

to L2 switch throughout the study. There was a greater time cost for an L2 to L1 switch than vice versa. These findings supported the relative strength hypothesis; as predicted, the cost was greater to switch to the stronger L1 than to the weaker L2.

However, Costa and Santesteban (2004) did not find an asymmetrical switching cost when proficient Spanish-Catalan speakers performed a code-switching task in their L1 and their weaker language. In this case, the proficiency of each language did not affect switching costs. These authors found that asymmetrical switching costs did not occur for highly proficient bilinguals. Thus, according to Costa and Santesteban (2004), it appears that a highly proficient bilingual uses an improved inhibitory mechanism (*improved* meaning that the inhibition does not rely on the overall proficiency of each language) to deal with switching into a weaker language, and that perhaps these bilinguals are extraordinarily experienced in language switching.

Li (1996) investigated the mechanisms involved in listeners' recognition of code-switched (CS) words. Are code-switched words easier to identify if they are pronounced in the same way as the remainder of the sentence or utterance? Li used a phonological task in which Cantonese-English bilinguals had to identify what word would occur in a particular sentence. Participants heard each sentence in segments. All of the sentences were in Cantonese. Phonological structure was also manipulated so that the code-switched targets were of two types: consonant-consonant (CC) words such as *flight* and consonant-vowel (CV) words such as *sell*. The code-switched target was either pronounced in English (code-switcher) or pronounced using Cantonese phonetics (borrower).

After each segment of the sentence was presented, the participant was asked to write the word they thought would fit into the sentence. Following is a simplified version of this procedure:

1st segment: I fed the stray c . . .
2nd segment: I fed the stray ca . . .
final segment: I fed the stray cat in the alley.

Participants were told to use English orthography for English words and Chinese characters for Cantonese words. The variable of interest was the amount of phonological information that the participants needed to correctly identify the target word. The effect of language phonetics confirmed the author's prediction that CS words, when pronounced in the guest language, provide cues to the listener and the pronunciation makes the word easier to identify. The guest language was English, because the main language of the sentence was Chinese, and the code-switched word was also in English. In other words, when the English targets were pronounced using English phonological rules, the word was easier to identify.

The participants in Li's (1996) experiment needed more acoustic information to identify CC words than CV words. This effect arose from the difference in language rules between the two languages. CC words are not legal in Cantonese; however, CV words are allowed in both English and Cantonese. Li argued that the CC words pronounced as borrowers (in Cantonese phonetics) became adapted and lost the phonological cues that usually aid in identification. CC borrowers (Cantonese phonetics) took more time to identify than CC code-switchers (English phonetics). According to Li's findings, phonological structure can affect and interact with a bilingual's ability to identify a code-switched word. The conclusion was that code-switching does not take any more time than processing a monolingual sentence, especially if variables such as phonological and phonotactics are taken into account.

Sign Languages across Cultures

It is important to realize that producing language goes beyond speech production and also encompasses the production of nonverbal language, such as sign language. Simply stated, people who are able to use sign language in addition to a spoken language are in fact, bilingual (Kuntze, 2000; Most, 2003). In addition to this concept of being bilingual, the case may also be that a deaf person uses two different types of sign language, thus making that person bilingual. Some researchers have focused on the cross-cultural use of sign language rather than the element of bilingualism in sign language (e.g., Goldwin-Meadow & Mylander, 1998; Goldwin-Meadow & Saltzman, 2000). Pizzuto and Volterra (2000) conducted a cross-linguistic and cross-cultural study of sign languages. They identified several sign languages—American Sign Language (ASL), Danish Sign Language (DSL), Chinese Sign Language (CSL), and Italian Sign Language (ISL). There is another distinction within sign languages—whether or not a particular sign is transparent or opaque. *Transparent signs* are signs that can usually be correctly guessed by non-signers (or signers of a different sign language). *Opaque signs* are signs that cannot be guessed by non-signers or signers of a different sign language.

Pizzuto and Volterra (2000) expected that culturally related signs, such as the sign for *well/good*, which are similar to an Italian gesture used by hearing people would not be guessed by non-Italians, either hearing or deaf.

The experimenters showed Italian speakers a videotape of 40 signs, half of which were labeled "transparent" and half labeled "opaque." The participants had to define the sign, or guess at the meaning of each sign, and write those definitions down. The results showed that the transparent ISL signs were correctly guessed by more than half of all of the participants (hearing and deaf, Italian and non-Italian). Also, the opaque signs were more difficult to guess, each sign received less than 50% of correct guesses from the hearing and deaf non-Italian participants. As for the culturally related signs, the meanings were guessed far less often as expected. The results also showed that deaf participants made the most correct guesses to the ISL signs regardless of transparency. In fact, the deaf participants also outperformed the hearing participants in guessing the culturally related signs. It seems as though knowing a sign language helps people guess the correct meaning of a sign from a different language. Researchers could also compare monolingual signers and bilingual signers (people who use two sign languages) in future research.

As mentioned at the beginning of this section, a person who uses a spoken language and a sign language is considered bilingual. In this vein, Kuntze (2000) examined code-switching between written English and ASL. Kuntze used camcorders to record signs used in a classroom setting. The code-switches reported were made by the teacher during a history lesson at a deaf school. Using finger spelling is considered a form of code-switching within ASL. Finger spelling is when a signer represents the English letters within a word in place of a sign. There are certain words, such as proper nouns or names, that need to be finger spelled. In addition, English words such as *was* or *it* may also be used within an ASL utterance because those words do not appear in ASL. Kuntze noted that the teacher may have used code-switches in order to help the students read their textbook on the subject, just as code-switching in spoken language could help bilinguals emphasize certain parts of conversation.

Language Learning

Virtually every child exposed to language builds a system of linguistic structure and can easily learn how to speak and acquire the rules of a particular language or languages. Many researchers are interested in language acquisition, whether it is a person's first language, or a second language. Lacerda (2003) introduced a language acquisition model relying on biological factors, perceptual processes, associations, and social interactions with parents. The following sections will discuss second language learning and the *critical period hypothesis*.

Learning a Second Language

Altarriba and Mathis (1997) investigated bilingual memory through a series of experiments aimed at exploring the role of lexical and conceptual representation in novice and expert bilinguals. The authors were testing the ideas set forth by Kroll and Stewart's (1994) Revised Hierarchical model regarding the organization of lexical and conceptual items in memory. As stated earlier in the chapter, this model suggested that bilinguals have two separate, but linked, lexical stores (one for each language) and a shared conceptual store.

In Altarriba and Mathis (1997), monolingual English speakers were given a series of training tasks designed to teach them Spanish, thus creating novice bilinguals in the sense that they had limited proficiency in Spanish. This experiment was designed to test the earliest stage of acquisition. After the novice bilingual training, novice and expert bilinguals were given a set of experimental tasks. In the first part of the experiment, monolinguals were given a training session in Spanish. The second part of the experiment consisted of the test condition. Both novice and expert bilinguals were given a set of common Spanish words, each paired with an English word. The types of English words presented were: the correct translation, an orthographically similar word, or a control word (unrelated). For example, for the Spanish word *cama* the correct translation would be *bed* the orthographically similar word would be *beg* and the control word would be *owe*. Novice and expert bilinguals were shown a Spanish word followed by an English word. The task was to decide if the English word was the correct translation of the preceding Spanish word. Novice bilinguals were slower for the orthographically similar words than for the unrelated words. Thus, there was an orthographic interference effect. Similarly spelled words made the task more difficult. The expert bilinguals were slower in the orthographically similar condition than in the unrelated condition, also suggesting an orthographic interference effect. In other words, similar spelling hurt performance. According to these findings, novice bilinguals were able to store orthography in memory after one training session.

Semantics were also investigated in a second experiment. For novice bilinguals, participants were slower for the semantically related word than for the unrelated word. It took longer for the novices to decide if the word was an exact translation. In addition, expert bilinguals were slower in the semantically related condition than in the unrelated condition. Both expert and novice bilinguals had access to meaningful related words, thus producing an interference effect. The results from this set of experiments suggested that in early stages of acquisition and in fluent bilinguals, both the lexical components and conceptual components of language are similar in that both produce interference effects under the circumstances of the experiments. According to Altarriba and Mathis (1997), novice bilinguals have both a lexical representation and a conceptual representation of their "new" language.

The results of Altarriba and Mathis (1997) argued that novice bilinguals showed semantic interference, which is not entirely supported by the Kroll and Stewart (1994) model. It is not expected that a newly bilingual person would show such conceptual interference effects because, according to that model, that conceptual link would not yet be available.

The other side of this issue has also been addressed. Talamas, Kroll, and Dufour (1999) also investigated the roles of orthography and semantics in second language acquisition. Talamas et al. (1999) tested the hypothesis that new learners of a second language rely heavily on form (i.e., orthography) in acquiring words. The hypothesis is that in more advanced stages of second language acquisition, learners begin to rely less on form and more on semantic features (i.e., word meaning). This idea goes against the findings of Altarriba and Mathis (1997), in that Talamas et al. argued that new learners do not rely on semantics.

Talamas et al. (1999) tested two groups of Spanish language learners: a more fluent learner group and a less fluent learner group. Note that none of the participants were truly "novice" bilinguals as was true in Altarriba and Mathis (1997). All of the participants were presented with word pairs; one word was a Spanish word and the other word was an English word. The participants were asked to determine if the pairs were correct translations. The Spanish word was manipulated so that it was the correct translation, a word orthographically related to the correct translation, or a word related to the meaning of the translation. Unrelated control words were also included in the experiment. The incorrect translation pairs were referred to as false translation pairs. The results showed that less fluent bilinguals experienced more interference from the false translations based on form (orthography) than based on semantics. On the other hand, more fluent bilinguals had more semantic interference than orthographic interference. On the surface, the Altarriba and Mathis findings and the Talamas et al. findings support competing views. Altarriba and Mathis found support for the notion that novice bilinguals form both orthographic (lexical) and conceptual (semantic) representations of words, thus showing both orthographic interference and conceptual interference.

Talamas et al. (1999) supported the idea that less fluent bilinguals show more interference for orthographically similar items than conceptually similar items, which supports a less developed conceptual representation. However, many differences arise when comparing the two studies, making it difficult to compare results directly. In Altarriba and Mathis (1997), monolingual English speakers were taught Spanish words and were truly novice bilinguals. These novice bilinguals were also given a training session prior to the experimental task that was comprised of the experimental words, perhaps making them highly fluent within that set of words—thus making them more like fluent bilinguals. In addition, Talamas et al. also included both semantically related targets and orthographically related targets into the same experiment. Perhaps the combination of these two types of false translations (Talamas et al.) affected the results in a way that the separation of these false translations did not (Altarriba & Mathis).

The Critical Period Hypothesis

The *critical period hypothesis* is a developmentally based hypothesis that states that the ability to learn a language proficiently is limited to the years before puberty. Supporters of this theory contend that adults are limited in their ability to acquire a second language. Hakuta, Bialystok, and Wiley (2003) used archival data to inquire about the age of second language acquisition. Specifically, the authors were interested in using census data to assess the existence of the so-called "critical period." Using data collected from immigrants whose L1 was either Spanish or Chinese;

Hakuta et al. were able to obtain data on proficiency in English, year of emigration into the United States, and educational background. If the critical period is a viable theory, then the number of immigrants acquiring L2 after a certain age would drop substantially. In order to test this claim, the authors set up two models: one that assumed the critical age was 15, and another that assumed the critical age was 20. Hakuta et al. predicted that there would be a point at which there would be a noticeably sharp decrease in the acquisition of English (at the point of the critical period). However, this discontinuity was not found in the data, demonstrating that acquiring L2 was not dependent on age. Although the data did not support the notion of a critical period, Hakuta et al. (2003) found that L2 proficiency does decline over the lifespan.

Unfortunately the Hakuta et al. (2003) study was not experimental, in other words, the authors did not manipulate any of the variables. However, the results obtained do reflect a trend in L2 acquisition. In addition to the problem of this study being nonexperimental, the data were over a decade old when this analysis was conducted, and perhaps different trends have emerged with more recent immigrants. Aside from the possible problems interpreting this study, it does provide valuable information regarding bilingualism, although not necessarily through psycholinguistic methods. The study that is presented next (Birdsong & Molis, 2001) involved Spanish-English bilinguals making decisions on the grammar of English sentences, again, to test the critical period hypothesis.

Birdsong and Molis (2001) attempted to replicate the findings of Johnson and Newport (1989) with Spanish-English bilinguals rather than Chinese-English and Korean-English bilinguals. Originally, Johnson and Newport's results supported the notion that there is a critical period for learning a language. The exact same procedure and materials were used in both of the experiments. This insured that the Birdsong and Molis experiment was an exact replication, except for the L1 of the participants. The participant's task was to indicate whether the sentence was grammatical or ungrammatical. The following examples were from Birdsong and Molis (2001, p. 237), however, they were originally from Johnson and Newport. (Note that the first sentence within each pair is the grammatical sentence, and the second sentence is ungrammatical.)

Every Friday our neighbor washes her car.
Every Friday our neighbor wash her car.
Two mice ran into the house this morning.
Two mouses ran into the house this morning.
The horse jumped over the fence yesterday.
The horse jumped the fence over yesterday.

Demographic measures were taken to record the age of arrival to the United States for each participant. Early arrivals were associated with early L2 learning, and late arrivals were associated with later L2 learning. According to Birdsong and Molis (2001), if there was evidence for a critical period in language acquisition, age of learning should not be related to language performance after puberty (the end of maturational development). Accordingly, age of learning should not be able to predict language performance, and the language performance post puberty should vary greatly. However, the results showed that post-pubescent arrivals to the United States did not vary that much in their ability to make grammatical decisions. The results showed that there was a trend for the relationship between age and performance for late arrivals as well as early arrivals. For example, according to these data, a 20-year-old will have an advantage over a 30-year-old, although both people have aged past the critical period.

In addition to age effects, in comparison, the Spanish-English bilinguals outperformed the Chinese- and Korean-English bilinguals from the Johnson and Newport (1989) study. Perhaps there is a relationship between the similarity of the L1 and L2 form and overall performance on a grammar task. It may be that learning a language similar to one's own L1 is advantageous to understanding the L2.

Taking this and newer evidence into account, it is suggested that the critical period hypothesis may not be the be-all and end-all of language acquisition. There may be a maturational, developmental effect; however, evidence does not always suggest an age limit in acquiring a second language.

Language and Culture

In this section, a variety of ideas are presented that are related to the relationship between language and culture. Researchers have asked many questions regarding this relationship. Does language influence the thought process? Does culture influence language? This section includes topics related to the relationship between language and culture. For instance, this includes the notion of color categories across languages, the representation of time, and the interpretation of figurative language.

The Sapir-Whorf Hypothesis Revisited: Linguistic Determinism and Relativity

The *Sapir-Whorf hypothesis* is the principle that language shapes other cognitive processes, namely thought processes. There are two ways to study the Sapir-Whorf hypothesis: a comparative approach, that is, compare populations that speak different languages; or, one may choose to use a single, bilingual population.

Linguistic determinism refers to the notion that language determines thought. *Linguistic relativity* means that thought processes are different for different languages. The way that bilinguals think about objects can vary due to differences in linguistic properties. For instance, Boroditsky and her colleagues (Boroditsky, Schmidt, & Philips, 2003) investigated Spanish speakers and German speakers in a series of tasks involving objects. The motivation for using Spanish and German was that both languages use a gender system. A gender system is a grammatical property of words (usually nouns) within a language (refer to the section of morphology in the current chapter for more information on gender systems). Spanish and German, for example have masculine, feminine, and neuter gender categories for nouns. Gender assignment tends to be very arbitrary within and across languages. This is apparent when an object is given a masculine gender in one language and a feminine gender in another. This difference has the potential to create a unique issue for bilingual speakers.

Boroditsky et al. (2003) asked whether Spanish-English bilinguals and German-English bilinguals would think differently about objects. Boroditsky et al. asked Spanish and German speakers (who were also proficient in English) to learn proper names for 24 objects. For instance, the name *Patrick* or *Patricia* was assigned to the object apple. The object names were chosen so that in one language the object was masculine, and in the other language the object was feminine. In the case of German, the word for apple is masculine, and the word for apple is feminine in Spanish. The entire experiment was conducted in English, which allowed the researchers to tap into conceptual

gender processing that is not language specific, in comparison to grammatical gender processing that *is* language specific. The authors predicted that German speakers would remember the *Patrick*-apple combination well because the German word for apple is masculine and the name *Patrick* reflects the object's gender. As predicted, memory was better for proper names that matched the grammatical gender of the object. The English speakers did not have interference from knowledge of grammatical gender, while the German-English and Spanish-English bilinguals had this interference. Because the actual experiment was conducted in English, this means that the participants' other language influenced their cognitive processing without having to specifically use their other language. These results support a *language-nonspecific access* view in which a bilingual's two languages interact regardless of the language being used at a particular time.

Research by Sera et al. (2002) also investigated the role of grammatical gender in language processing. In one study, French speakers and Spanish speakers were asked to make gender-based classifications of drawings of objects. English speakers were also included. Pictures of people and objects were presented to four age groups (kindergarteners, second graders, fourth graders, and adults). Participants were asked to assign a male or female voice to the object that was pictured. It is interesting to note that English and Spanish speakers' assignments were very similar although English is not a gendered language. The voice assignments varied depending upon the grammatical gender of an object within a language. This means that an object that was feminine in one language was assigned a female voice; and, that same object in the other language was masculine and was assigned a male voice. However, it is important to note that kindergarten-aged children did not show these effects. The authors suggested that more practice in a language had more of an impact on the language's influence on the activity.

In a follow-up to the French and Spanish study, Sera et al. (2002) conducted another study with German speakers. The findings from this study did not support the notion of grammatical gender-influencing voice assignments. The German speakers did not assign voices in a systematic way. This would seem to disconfirm the Boroditsky et al. (2003) findings because that study did in fact show the grammatical gender effect. However, it is important to note that Sera et al. did not test adult German speakers in their study, and that all of Boroditsky et al.'s participants were adults. This anomaly could be used to support Sera et al.'s conclusion that the grammatical gender effects may become apparent in adult German speakers. In addition to gender effects, other linguistic items, such as the processing of color terms, may differ in different languages and cultures. The subsequent section will address the notion of language influencing other cognitive functions such as color categorization.

Color Terms and Categorization across Cultures

The recent research in this domain has involved different techniques such as longitudinal studies and comparative studies. *Longitudinal studies* test and retest the same group of individuals over a period of time. The individuals involved in a longitudinal study can be tested over years, or even decades of their lives! *Comparative studies* investigate different cultures or groups and compare the results from these different groups to each other.

Roberson, Davidoff, Davies, and Shapiro (2004) found results that supported the notion of the linguistic relativity hypothesis. Again, this hypothesis is that different languages have different effects on thought processes. Roberson et al. (2004) did a comparison study—comparing data across three different cultures with unique languages. The experimenters studied three different languages: English, Himba, and Berinmo. Himba and Berinmo have a similar number of color terms but are used in very different cultures. The people who speak Berinmo have adopted Western

dress and Western schools, while the Himba people identify with more traditional culture. Participants were asked to give category judgments for color tiles. In addition, participants were asked to indicate tiles that were the "best" representation of a particular color term and to categorize colors by similarity. For instance, in one experiment, participants were given sets of three color chips and were asked which two chips looked most alike. In another experiment, participants were given a forced-choice recognition task. A *forced-choice recognition task* is a task in which a participant is shown two items at test, and is asked to choose which item had been presented to them earlier. Participants were shown one color stimulus followed by pairs of color stimuli (the previous color stimulus and another color from the same category). The main finding of this set of experiments was that Himba participants categorized the colors in terms of the color words that they use in their language and culture and not according to English or Berinmo color categories. This finding was evidence of a relationship between language, thought, and culture.

Roberson et al. (2004) also investigated color categories with English and Himba children over a period of three years. The results were suggestive of a language-dependent explanation of color categorization. One way in which the two groups of children were similar was the unpredictable acquisition of color terms. For both the English and Himba groups, the order that color terms were acquired was not systematic, although there was a trend for the terms *brown* and *gray* to be acquired later on for English children. However, English children showed good memory performance for focal colors in English, and Himba children showed superior memory for focal colors in Himba. *Focal colors* are the basic colors within a language. For instance, a few examples of focal colors in English are blue, red, and yellow. Color terms that are not focal colors include turquoise, magenta, and lime green. This difference in the color organization that developed very early in color term acquisition shows that children must learn color categories and that these categories are not inherent in development. The rapid change in color organization supports the notion of linguistic relativity in that language had an influence on the children's color categorization. The authors noted that the acquisition of color terms is a gradual process for children across language; however, the organization of those color terms is variable across languages and cultural groups. Future studies should investigate the role of language in bilinguals' interpretations of color similarity.

Other Lexical Categories

Aside from grammatical gender and color terms, perhaps other areas of thought are also determined or influenced by language. For instance, does a bilingual person think of the concept of time in different ways depending upon the language of context? Boroditsky (2001) investigated this matter by giving Mandarin and English speakers a series of tasks regarding their conceptual organization of time. It is critical to note that there is an important spatial distinction between the ways that Mandarin speakers and English speakers tend to talk about time. English speakers tend to use language that implies that time passes in a horizontal line, for instance, along a timeline that runs from left to right across. On the other hand, Mandarin speakers use both horizontal and vertical spatial metaphors to describe the concept of time, and there is a tendency for Mandarin speakers to use vertical metaphors more often when speaking about time. Given this information, Boroditsky tested Mandarin and English individuals' performance on tasks involving horizontal and vertical illustrations of events.

Mandarin speakers and English speakers had to verify the truth of sentences such as: *March comes before April* and *March comes earlier than April* (Boroditsky, 2001, p. 8) after viewing either

a vertically oriented diagram or a horizontally oriented diagram. Again, this distinction is important because only the Mandarin speakers use vertical spatial metaphors for describing time. The results of this experiment showed that the English and Mandarin speakers' results differed with regards to the spatial diagrams that were presented to them before making the truth decisions. English speakers made their decisions regarding temporal events more quickly when they followed horizontal illustrations than vertical illustrations. However, Mandarin speakers were faster to make the truth decisions following vertically orientated illustrations than horizontal illustrations. Thus, the results support the notion that language can influence the way people think about a nonlinguistic concept such as time. The next step is to include bilinguals in this type of study.

In a follow up to the Mandarin monolingual and English monolingual experiment, Boroditsky (2001) attempted to replicate those results with Mandarin-English bilinguals. The bilingual participants varied on their proficiency in English and the age of acquisition of English. All of the participants were native in Mandarin. When English was learned at an earlier age, bilinguals showed less of a vertical bias in their true/false decisions regarding temporal phrases. The author also noted that the orthographies of Mandarin and English are very different. English is always written from left to right, in a horizontal manner. On the other hand, Mandarin can be written either vertically or horizontally. Perhaps writing direction also has an influence on how people think about temporal events.

Figurative Language Processing

Figurative language is language that appears ambiguous in that the actual, literal meaning of a sentence or phrase is not the intended meaning. For instance, if you are a native English speaker from the United States, you are probably familiar with the phrase "*she let the cat out of the bag*." That phrase is figurative because its overall meaning is not related to releasing a cat from a bag, but is a way of saying that someone had revealed a secret. Typically, figurative language is culture specific, meaning that they can represent something important to a particular culture. In addition, figurative statements may not always be direct translations from one language to another.

Vaid and Martinez (2001) investigated figurative language processing with Spanish-English bilinguals. One type of figurative language comes in the form of proverbs. *Proverbs* are culturally significant sayings that illustrate social mores and other beliefs. In the Vaid and Martinez study, Spanish-English bilinguals were presented with proverbs and were then asked to translate or paraphrase them. Participants were shown familiar and unfamiliar proverbs in both Spanish and English. The task was to either paraphrase the proverb within the same language, or to translate the proverb to the other language. Then, participants were given a surprise recognition test to investigate their memory for the proverbs. Examples of the proverbs included:

High familiarity in English/ Low familiarity in Spanish:
The grass is always greener on the other side.
High familiarity in Spanish/ Low familiarity in English:
Es mejor prevenir que lamentar.
(Translation: *It is better to prevent than to lament.*)
Low familiarity in English / Low familiarity in Spanish:
Half a loaf is better than no bread at all.
Cuidado con el doctor joven y el peluquero viejo.
(Translation: *Take care with the young doctor and the old hairdresser.*)

Two different views of figurative language access were discussed. For instance, remembering the figurative phrase in the language that it was presented in would support a *literal activation view*. However, if the language of presentation is not remembered, and a bilingual retrieves the phrase in the translation language, a *direct access view* of figurative language would be supported. The direct access view suggests that the conceptual meaning is retained, regardless of the language it was initially presented in. Vaid and Martinez's memory test results showed that their participants were able to retain the original language of the proverb in memory. They were more likely to correctly recognize the proverb when it was shown in the language of original presentation. Overall, the data supported the idea that proverbs were not remembered as whole conceptual units and that the original language seemed to be remembered well, thus supporting a literal activation view. Again, the literal activation view suggests that people are remembering the proverbs word-for-word rather than as a whole conceptual unit. In the case where the conceptual meaning of a proverb is retained, then the language of encoding would not matter, and participants would recall the proverb with equal frequency in English and Spanish.

Aside from Vaid and Martinez's (2001) work with proverbs, other researchers have used metaphors and idioms as stimuli in their bilingual experiments (e.g., Harris, Tebbe, Leka, Garcia, & Erramouspe, 1999). Memory tasks have been widely used as a means of understanding the comprehension of figurative language.

Metaphors are phrases in which words that describe a particular item are used to make a direct comparison to another item. An example of a metaphor is the phrase: *he is an open book*. In this case, the words *open book* are not related to a book at all, but are used to describe a person. In other words, this person is open about his feelings and thoughts, and other people can easily detect his mood. A *simile* is essentially a metaphor, except the comparison is mediated by the words *like* or *as*. An example of a simile is the phrase: *the snow is like a wet blanket*. The only grammatical difference between similes and metaphors is the presence of the word *like* or *as* in similes.

In the first experiment, Harris et al. (1999) presented English monolinguals with a list containing 16 English metaphors and 16 English similes. The results revealed that the English speakers tended to recall all of the figurative phrases as metaphors, regardless of how the sentences were originally presented. Spanish speakers recalled both metaphors and similes as similes. The pattern of results was assumed to be related to possible frequency effects, namely that metaphors are more common in English, and similes are more common in Spanish. In this case, language of presentation influenced recall.

Harris et al. (1999) took their work a step further by testing Spanish-English bilinguals using the same recall task. The bilinguals were fluent in both languages; however, slightly more than half of the participants named Spanish as their native language, with the remaining participants being native English speakers. However, as with Spanish monolinguals, Spanish-English bilinguals tended to recall metaphors and similes as similes. The authors comment that the Spanish simile bias may be a stronger effect than the English metaphor bias since it emerged from the bilingual version of the experiment. According to Harris et al. (1999) metaphors are more common in English and similes are more common in Spanish. It is difficult to explain the bilingual data, and the authors noted that the retention of the Spanish simile bias does not fit very well into the idea that participants were in a bilingual mode (both languages were being activated by the task, so both the English metaphor and the Spanish simile biases should have demonstrated themselves in similar ways). Perhaps Harris et al.'s conclusion is right, in that the Spanish simile effect is stronger, thus providing for the explanation of the bilingual results. The results do provide some evidence of a language-nonselective account, as that the English metaphor bias was not strong in the bilingual data. It may be that the Spanish bias affected reliance

on the English metaphor bias in recall. Although the participants used English more frequently, the bilinguals may have been relying more on their Spanish language knowledge during this experiment. In that case, the English metaphor bias may not have had a large impact on recall.

Blair and Harris (1981) investigated the interaction of a bilingual person's two languages by presenting bilinguals with idioms. An *idiom* is an expression, as an entire unit, that cannot be understood from the individual meanings of each of its words. For instance, in English, the phrase *you are pulling my leg* is used when a person thinks what is told to him is a joke. The sentences included normal English sentences, literal translations of Spanish idioms, and English sentences with reversed noun-modifier pairs (see following example). The purpose of switching the order of the noun and modifier was to make the English sentences resemble the syntax associated with the Spanish language. The following are examples from Blair and Harris (1981, p. 461):

> Idiom translation: Jalopy wants to say car in one form of English slang.
> (*querer decir* = to mean, literal translation *to want to say*)
> Noun-modifier reversal: The swimmer froze in the water icy after diving into the scenic mountain lake.
> Typical English: In many states, buying lottery tickets is illegal.

Knowing typical Spanish syntax helped the bilinguals understand the literal idiom translations and the noun-modifier reversed sentences, which supports a language-nonselective view. The authors concluded that the bilinguals' languages were interacting although only one language was specifically being tested. These results support the language-nonselective view. The language-nonselective view suggests that both languages are activated simultaneously regardless of the language that the bilingual is using at a particular time.

In order to more clearly identify the type of language access that is at work during figurative language processing, researchers must attempt to replicate past results using a variety of tasks and methodology. It would be advantageous to continue investigating this subject matter using a paradigm such as priming—for example, presenting participants with idiomatic expressions, and then after a brief period of time, presenting a target word that is either related or unrelated to the idiomatic expression. Then, one could measure how quickly participants name the target word, and can assess processing time, and in effect, can interpret those results in the framework of the language-selective or nonselective view.

Summary and Conclusion

The purpose of this chapter was to provide an overview of the general areas of the psycholinguistics of language. Phonology is the study of the sounds associated with language. In addition to phonology, semantics was also covered. Semantics deals with meaning. Morphology refers to the smallest parts of language that provide meaning to words (these meaningful parts are called morphemes). Morphology deals with the structure of words, while syntax is the rules for structuring sentences in language. Pragmatics provides speakers with a guide for using language and interacting with other speakers. In addition, this chapter explored how language is processed in context, the production of language (i.e., TOT and sign language), language learning (for instance, the critical period hypothesis), and the effects of culture, language and thought. The chapter investigated the various theoretical and empirical findings important to the study of the psycholinguistic aspects of bilingualism. The review provided here is a selection of research that is relevant to the current theories and views

of the psycholinguistics of bilingualism. Researchers are continuing to attempt to understand the relationship between a bilingual's two languages. Are the languages activated at the same time, or is only one language activated according to the language that is being used? The major competing views in this field are the language-selective view and the language-nonselective view. The language-selective view represents the idea that a bilingual's two languages are separate from one another and are activated one at a time, rather than in parallel. The researchers in support of the language-nonselective view suggest that bilinguals' languages are activated simultaneously and can affect each other, even during a monolingual task. These two views can be tested in a variety of ways in the field of psycholinguistics, for instance, recording how long it takes to read a particular word—allowing researchers to estimate the time that is required to process that word. This chapter has also explained a variety of other research methods used in this field. Overall, there seems to be a theme of language interaction at a variety of levels, in other words, there is something different about bilingual language processing in comparison to monolingual language processing. The different levels of analysis (e.g., phonology, semantics, and morphology) allow researchers to discover ways in which bilingual language processing may or may not differ from monolingual language processing. Aside from the levels of analysis, other areas of language have provided researchers with the potential of collecting converging evidence of bilingual language processing.

List of Key Words and Concepts

Between-language competitor, Bilingual Interactive Activation Model, Causative sentence, Clang associations, Clitics, Conceptual links, Code-switching, Comparative studies, Conceptual store, Control (Filler), Critical Period Hypothesis, Derivational morphemes, Direct Access View, Eye-movements, Figurative language, Focal colors, Forced-choice recognition task, High attachment, Idioms, Inflections, Interlingual homographs, Language-nonselective view, Language-selective view, Letter detection task, Levels of analysis, Lexical decision task, Lexical links, Linguistic Determinism, Linguistic Relativity, Literal Activation View, Longitudinal studies, Low attachment, Mental lexicon, Metaphors, Morphological gender, Morphology, Naming task, Opaque signs, Orthography, Phonology, Pragmatics, Prime, Proverbs, Psycholinguistics, Rapid Serial Visual Presentation, Relative Strength Hypothesis, Revised Hierarchical Model, Sapir-Whorf Hypothesis, Semantics, Similes, Syntax, Target, Tip-of-the-tongue, Transparent signs, Visual mask, Within-language competitor

Internet Sites Related to the Psycholinguistics of Bilingualism

Bilingualism and Language Processing: http://www.tamiu.edu/~rheredia/bilingual ism.html

Bilingualism database from the University of Birmingham: http://www.education.bham.ac.uk/webapps/bilingualism/search.php

San Diego State University Laboratory for Language and Cognitive Neuroscience: http://emmo-reylab.sdsu.edu/bimodal.php

Discussion Questions

1. Compare and contrast morphemes and phonemes.
2. Briefly explain the asymmetrical code-switch cost.

3. Does language influence thought? Use two examples to illustrate your point.
4. Discuss the critical period for language; do you think one exists? Explain.
5. Explain the difference between a language specific view and a language nonspecific view of bilingualism.
6. What is figurative language? Explain why it is important for translators to understand figurative language while translating from one language to another.
7. What are homographs? Give one example in English. What are interlingual homographs? Give at least one example.
8. What is the difference between a balanced bilingual and an L1 dominant bilingual? How would this difference affect people's performance on bilingual tasks?
9. Identify and explain three levels of language analysis discussed in the beginning of the chapter.
10. What is the difference between opaque and transparent signs in sign language?

Suggested Research Projects

1. *Experimental Study: Interlingual homographs:* Replicate an experiment that was discussed in this chapter that tests how language context affects a bilingual's interpretation of an interlingual homograph. Collect data to evaluate. Explain which view of bilingualism (language-selective or language-nonselective) would be supported by your results.
2. *Literature Search: Using PsycInfo:* Search a database, such as PsycInfo (http://www.apa.org/psycinfo), for a recent selection of articles on the psycholinguistics of bilingualism. Identify the languages of the participants in the experiment, the hypotheses, and the methods used for collecting data.
3. *Gender and Language: Do English nouns have gender?* Although English does not use grammatical gender, perhaps some objects seem to have characteristics that are either male or female. Select 50 nouns, and have 15 people rate them on a feminine-masculine scale. Interpret your results. Do some English words seem to be more feminine or more masculine based upon the opinions of English speakers?
4. *Research Paper: Choose an area of the psycholinguists of bilingualism.* Write a five-page research paper using at least three references from academic journals.
5. *Create a language: Morphemes.* Using what you have read about morphology, *invent a language* that has at least one base word (such as *walk*) and five word endings (such as *–ing*) and use those morphemes to create different words.

Suggested Readings

Carroll, D. W. (2004). *Psychology of language.* Belmont, CA: Wadsworth.

Heredia, R. R., & Altarriba, J. (Eds.), *Bilingual sentence processing.* Amsterdam: Elsevier.

Wei, L. (2002). The bilingual mental lexicon and speech production process. *Brain and Language, 81,* 691–707.

References

Altarriba, J. (2003). Does cariño equal "liking"? A theoretical approach to conceptual nonequivalence between languages. *International Journal of Bilingualism, 7,* 305–322.

Altarriba, J., & Gianico, J. L. (2002). The use of sentence contexts in reading, memory and semantic disambiguation. In R. R. Heredia & J. Altarriba (Eds.), *Bilingual sentence processing* (pp. 111–135). Amsterdam: Elsevier.

Altarriba, J., & Gianico, J. L. (2003). Lexical ambiguity resolution across languages: A theoretical and empirical review. *Experimental Psychology, 50,* 159–170.

Altarriba, J., Kroll, J. F., Sholl, A., & Rayner, K. (1996). The influence of lexical and conceptual constraints on reading mixed-language sentences: Evidence from eye fixations and naming times. *Memory & Cognition, 63,* 875–890.

Altarriba, J., & Mathis, K. M. (1997). Conceptual and lexical development in second language acquisition. *Journal of Memory and Language, 36,* 550–568.

Birdsong, D., & Molis, M. (2001). On the evidence for maturational constraints in second-language acquisition. *Journal of Memory and Language, 44,* 235–249.

Blair, D., & Harris, R. J. (1981). A test of interlingual interaction in comprehension by bilinguals. *Journal of Psycholinguistic Research, 10,* 457–467.

Boroditsky, L. (2001). Does language shape thought?: Mandarin and English speakers' concepts of time. *Cognitive Psychology*, *43,* 1–22.

Boroditsky, L., Schmidt, L. A., & Phillips, W. (2003). Sex, syntax, and semantics. In D. Genter & S. Goldwin-Meadow (Eds.), *Language in the mind: Advances in the study of language and thought* (pp. 61–79). Cambridge, MA: MIT Press.

Brysbaert, M., Van Dyck, G., & Van de Poel, M. (1999). Visual word recognition in bilinguals: Evidence from masked phonological priming. *Journal of Experimental Psychology: Human Perception and Performance, 25,* 137–148.

Carroll, D. W. (2004). *Psychology of language.* Belmont, CA: Wadsworth.

Chan, B. H. S. (2004). Beyond "contextualization": Code-switching as a "textualization cue." *Journal of Language and Social Psychology, 23,* 7–27.

Costa, A., Colomé, Á., Gómez, O., & Sebastián-Gallés, N. (2003). Another look at cross-language competition in bilingual speech production: Lexical and phonological factors. *Bilingualism: Language and Cognition, 6,* 167–179.

Costa, A., & Santesteban, M. (2004). Lexical access in bilingual speech production: Evidence from language switching in highly proficient bilinguals and L2 learners. *Journal of Memory and Language, 50,* 491–511.

Costa, A., Santesteban, M., & Caño, A. (2005). On the facilitatory effects of cognate words in bilingual speech production. *Brain and Language, 94,* 94–103.

de Diego Balaguer, R., Costa, A., Sebastián-Galles, N., Juncadella, M., & Caramazza, A. (2004). Regular and irregular morphology and its relationship with agrammatism: Evidence from two Spanish-Catalan bilinguals. *Brain and Language, 91,* 212–222.

de Groot, A. M. B., Delmaar, P., & Lupker, S. J. (2000). The processing of interlexical homographs in a bilingual and monolingual task: Support for nonselective access to bilingual memory. *Quarterly Journal of Experimental Psychology, 53,* 397–428.

Deuchar, M., & Quay, S. (1998). One vs. two systems in early bilingual syntax: Two versions of the question. *Bilingualism: Language and Cognition, 1,* 231–243.

Dussias, P. E. (2003). Syntactic ambiguity resolution in L2 learners. *Studies in Second Language Acquisition, 25,* 529–557.

Duyck, W., Diependaele, K., Drieghe, D., & Brysbaert, M. (2004). The size of the cross-lingual masked phonological priming effect does not depend on second language proficiency. *Experimental Psychology, 51,* 116–124.

Goldwin-Meadow, S., & Mylander, C. (1998). Spontaneous sign systems created by deaf children in two cultures. *Nature, 391,* 279–281.

Goldwin-Meadow, S., & Saltzman, J. (2000). The cultural bounds of maternal accommodation: How Chinese and American mothers communicate with deaf and hearing children. *Psychological Science, 11,* 307–314.

Gollan, T. H., Bonanni, M. P., & Montoya, R. I. (2005). Proper names get stuck on bilingual and monolingual speakers' tip of the tongue equally often. *Neuropsychology, 19,* 278–287.

Greenberg, S. N., & Saint-Aubin, J. (2004). Letter detection for homographs with different meanings in different texts. *Bilingualism: Language and Cognition, 7,* 241–253.

Hakuta, K., Bialystok, E., & Wiley, E. (2003). Critical evidence: A test of the critical-period hypothesis for second-language acquisition. *Psychological Science, 14,* 31–38.

Harris, R. J., Tebbe, M. R., Leka, G. E., Garcia, R. C., & Erramouspe, R. (1999). Monolingual and bilingual memory for English and Spanish metaphors and similes. *Metaphor and Symbol, 14,* 1–16.

Hartsuiker, R. J., Pickering, M. J., & Veltkamp, E. (2004). Is syntax separate or shared between languages? Cross-linguistic syntactic priming in Spanish-English bilinguals. *Psychological Science, 15,* 409–414.

Heredia, R. R., & Altarriba, J. (2001). Bilingual language mixing: Why do bilinguals code-switch? *Current Directions in Psychological Science, 10,* 164–168.

Hermans, D., Bongaerts, T., De Bot, K., & Schreuder, R. (1998). Producing words in a foreign language: Can speakers prevent interference from their first language? *Bilingualism: Language and Cognition, 1*(3), 213–229.

Hernandez, A. E., Bates, E. A., & Avila, L. X. (1994). On-line sentence interpretation in Spanish-English bilinguals: What does it mean to be "in between"? *Applied Psycholinguistics, 15,* 417–446.

Hoover, M. L., & Dwivedi, V. D. (1998). Syntactic processing by skilled bilinguals. *Language Learning, 48,* 1–29.

Jared, D., & Kroll, J. F. (2001). Do bilinguals activate phonological representations in one or both of their languages when naming words? *Journal of Memory and Language, 44,* 2–31.

Johnson, J. S., & Newport, E. L. (1989). Critical period effects in second language learning: The influence of maturational state on the acquisition of English as a second language. *Cognitive Psychology, 21,* 60–99.

Kolers, P. (1966). Reading and talking bilingually. *American Journal of Psychology, 3,* 357–376.

Kroll, J. F., & de Groot, A. M. B. (1997). Lexical and conceptual memory in the bilingual: Mapping form to meaning in two languages. In J. F. Kroll & A. M. B. de Groot (Eds.), *Tutorials in bilingualism: Psycholinguistic perspectives* (pp. 169–199). Mahwah, NJ: Lawrence Erlbaum Associates.

Kroll, J. F., & Stewart, E. (1994). Category interference in translation and picture naming: Evidence for asymmetric connections between bilingual memory representations. *Journal of Memory and Language, 33,* 149–174.

Kuntze, M. (2000). Codeswitching in ASL and written English language contact. In K. Emmorey & H. Lane (Eds.), *The signs of language revisited* (pp. 287–302). Mahwah, NJ: Lawrence Erlbaum Associates.

Lacerda, F. (2003). Phonology: An emergent consequence of memory constraints and sensory input. *Reading and Writing: An Interdisciplinary Journal, 16,* 41–59.

Lehtonen, M., & Laine, M. (2003). How word frequency affects morphological processing in monolinguals and bilinguals. *Bilingualism: Language and Cognition, 6,* 213–225.

Li, P. (1996). Spoken word recognition of code-switched words by Chinese-English bilinguals. *Journal of Memory and Language, 35,* 757–774.

Macnamara, J., & Kushnir, S. (1971). Linguistic independence of bilinguals: The input switch. *Journal of Verbal Learning and Verbal Behavior, 10,* 480–487.

Marian, V., & Spivey, M. (2003). Competing activation in bilingual language processing: Within- and between-language competition. *Bilingualism: Language and Cognition, 6,* 97–113.

Meuter, R., & Allport, A. (1999). Bilingual language switching in naming: Asymmetrical costs of language selection. *Journal of Memory and Language, 40,* 25–40.

Most, T. (2003). The use of repair strategies: Bilingual Deaf children using sign language and spoken language. *American Annals of the Deaf, 148,* 308–314.

Namei, S. (2004). Bilingual lexical development: A Persian-Swedish word association study. *International Journal of Applied Linguistics, 14,* 363–388.

Naremore, R. C. (1985). Explorations of language use: pragmatic mapping in L1 and L2. *Topics in Language Disorders, 5*(4), 66–69.

Pizzuto, E. & Volterra, V. (2000). Iconicity and transparency in sign languages: A cross-linguistic cross-cultural view. In K. Emmorey & H. Lane (Eds.), *The signs of language revisited* (pp. 261–286). Mahwah, NJ: Lawrence Erlbaum Associates.

Roberson, D., Davidoff, J., Davies, I. R. L., & Shapiro, L. R. (2004). The development of color categories in two languages: A longitudinal study. *Journal of Experimental Psychology: General, 133,* 554–571.

Roelofs, A. (2003). Shared phonological encoding processes and representations of languages in bilingual speakers. *Language and Cognitive Processes, 18,* 175–204.

Scheutz, M. J., & Eberhard, K. M. (2004). Effects of morphosyntactic gender features in bilingual language processing. *Cognitive Science, 28,* 559–588.

Schreuder, R., & Weltens, B. (1993). *The bilingual lexicon.* Philadelphia: John Benjamins North America.

Sera, M. D., Elieff, C., Forbes, J., Burch, M. C., Rodriguez, W., & Dubois, D. P. (2002). When language affects cognition and when it does not: An analysis of grammatical gender and classification. *Journal of Experimental Psychology: General, 131,* 377–397.

Silva, R. S. (2000). Pragmatics, bilingualism, and the native speaker. *Language & Communication, 20,* 161–178.

Talamas, A., Kroll, J. F., & Dufour, R. (1999). From form to meaning: Stages in the acquisition of second-language vocabulary. *Bilingualism: Language and Cognition, 2*(1), 45–58.

Vaid, J., & Martinez, F. (April, 2001). *Figurative language and thought across languages: What transfers?* Poster presented at the Third International Symposium on Bilingualism, University of the West of England, Bristol, UK.

Wei, L. (2002). The bilingual mental lexicon and speech production process. *Brain and Language, 81,* 691–707.

Chapter 5

Bilingualism and Aging

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Cognitive aging and bilingualism is a research area in its infancy. It lies at the intersection of studies of cognitive aging (almost exclusively monolingual) and studies of bilingual processing (almost exclusively on children and young adults). Although there are relatively few available studies in this research niche, the available studies suggest some exciting directions with implications for both fields. This chapter offers a brief summary of the field of monolingual aging, a review of the current literature in bilingual aging, and a model integrating the basic mechanisms of cognitive aging with a current theory of bilingual processing. The emphasis is decidedly cognitive and focuses on patterns of preservation and loss in language processing among older adults.

Explanatory Theories in Cognitive Aging

At least four major theories are commonly adduced to explain differences in cognitive performance between younger and older adults (Park, 2000): (a) slowed processing speed, (b) shrinking working memory, (c) inhibitory deficits, and (d) declining sensory function. The theory of *slowed processing speed* suggests that most, if not all, processing deficits are due to generalized cognitive slowing (Cerella, 1985; Salthouse, 1996). A second theory argues that *working memory* "shrinks" with age (Craik & Byrd, 1982). Working memory is a short-term memory store where information is activated and temporarily maintained for immediate use (Baddeley, 1986; Just & Carpenter, 1992)—not unlike RAM memory in a computer. Following this computer analogy, older adults have less working memory capacity—smaller RAM—than younger adults. The situation is further complicated by an interaction between slowed processing speed and shrinking working memory because information temporarily stored in working memory may drop out before manipulations further downstream can be performed on it (Salthouse, 1996). The third theory—*inhibitory deficits*—

suggests that older adults experience an increasing inability to inhibit distracting information during cognitive processing (Hasher & Zacks, 1988). Thus, irrelevant information is kept beyond its due in working memory, and this compromises processing efficiency. Finally, the *sensory function* theory argues that the correlation between declining sensory acuity and declining cognition among older adults is explained by a loss of brain integrity for which sensory acuity is an index (Baltes & Lindenberger, 1997). Each of these theories is illuminating for how aging might affect language, and in the following paragraphs a selective review of that literature is provided.

Monolingual Aging

The vast majority of studies on language and cognitive aging focus on monolinguals. A sketch of the major findings in this literature is given in the following paragraphs via a representative bibliographic review of current research. Three general comments may be made at the outset.

First, a generalized, although incremental, deterioration in language abilities in older ages has been observed across languages. Juncos-Rabadan (1994b) analyzed data from 14 languages and found similar language declines across age groups (e.g., 50–59, 60–69, 70–91) in each language.

Second, these generalized deficits among older individuals are asymmetric such that production deficits (speaking, writing) are more marked than comprehension deficits (e.g., understanding, reading; Burke, MacKay, & James, 2000).

Third, these deficits seem not to seriously affect the normal linguistic and conversational functioning of older adults, due largely to simple and successful strategies of compensation (Wingfield & Stine-Morrow, 2000).

Given these three general comments about aging and monolingualism, the following paragraphs consider the effects of aging on commonly recognized subcomponents of language processing: verbal/auditory deficits, word-level recognition and retrieval, syntactic processing, constructing the text-base and situation model, and finally discourse and conversational skills (for similar reviews, see Ryan, 1990; Wingfield & Stine-Morrow, 2000).

Verbal/Auditory Deficits

Physiological changes in aging include loss of hearing sensitivity for speech at higher frequencies and poorer speech discrimination. Most speech is produced below the high frequency range of 3000 Hz (Bergman, 1980). However, some sounds (e.g., s, k, f, and t) may be produced above that range, and older adults who have lost hearing sensitivity at higher ranges (e.g., 4000 Hz) may experience difficulties distinguishing such sounds (Tun & Wingfield, 1999). For this reason some older adults must use devices to amplify sound frequencies, but many individuals are able to adjust for this loss (termed *presbycussis*) by making greater use of contextual information in decoding spoken speech (Wingfield, 2000). Older adults also experience changes in voicing mechanisms, range of frequency, and speech rate (Beasley & Davis, 1981).

Word-Level Recognition and Retrieval

Perhaps the most common linguistic complaint of older adults is failed *word-finding*—the inability to think of a particular word during a conversation, etc., (Rabbitt, Maylor, Mcinnes, Bent,

& Moore, 1995). This observation has been documented in both clinical and experimental work using a variety of investigative methods. A common clinical test of word retrieval is *confrontation naming* or picture-naming in which a participant is shown a series of pictures of objects, running from very common objects (e.g., a ball or chair) to less common objects (e.g., a stethoscope), and he or she is asked to name each object. Older versus younger adults often experience difficulties in thinking of the correct names, and indeed results show a decline in accuracy for older versus younger adults (Au et al., 1995; Feyereisan, 1997). Formal investigations of the everyday *tip-of-the-tongue phenomenon* show that it increases with age, as evidenced by diary studies (Burke, MacKay, Worthley, & Wade, 1991) and laboratory inducement (Burke, Locantore, Austin, & Chae, 2004). Access problems are also suggested by *gating techniques* (Grosjean, 1996) in which participants hear the initial 50 ms of a word and are then required to produce the word. Typically, older adults relative to younger adults require additional time before recognizing the word (Wingfield, Aberdeen, & Stine, 1991). Again, however, when provided with more versus less linguistic context, older adults show fewer deficits—a finding that would seem to confirm their strategic use of contextual information to compensate for cognitive slowing (Wingfield et al., 1991). This implies that the lexical forms of the words are available (i.e., they have not been "erased" or lost) but that they require more activation from additional environmental cues to make them available for processing (Tulving & Pearlstone, 1966). Younger adults may not need to exploit the additional linguistic cues; older adults do.

In contrast, semantic retrieval—the retrieval of word *meaning*—and the structure of semantic memory are little different from young to old. Here the investigative paradigm is *semantic priming* (see Altarriba & Gianico, this volume). The typical semantic priming effect is that, given a word prime (e.g., doctor), participants are faster to name the word (or make lexical decisions) when shown a related word (e.g., nurse) than when shown an unrelated word (e.g., table). Faster reaction times (RTs) suggest that activation spreads more easily among related versus unrelated nodes in the semantic network. Interestingly, not only do older adults perform similarly to younger adults, but some work shows faster RTs for older adults (Duchek & Balota, 1993; Laver & Burke, 1993).

These results argue that the structure of semantic memory, and thus semantic retrieval, undergo little deterioration with age. This is not surprising since it is usually effortful versus automatic memory tasks on which older adults show decrements relative to younger adults. Effortful tasks are those that require explicit searches through memory (as with word-finding), whereas automatic tasks do not. Retrieval of the meaning of a word as a result of reading that word is an automatic process. In fact, as the above priming experiments make evident, once a meaning is activated, the activation of related meanings is also raised, and hence these, too, become more available for retrieval. These automatic mental mechanisms are not as dramatically affected by aging as are the more effortful and controlled mechanisms.

Syntactic Processing

Older adults relative to younger adults use a more restricted range of complex syntactic forms and make more errors when using simple forms (Kemper, 1987a; 2001; Kynette & Kemper, 1986). Older adults also show less recall for prose when syntactic forms or anaphoric references require high working memory load (Kemper, 1987b; Light, Capps, Singh, & Owens, 1993). Anaphoric reference is the relation between a pronoun and its antecedent. As an example, consider the processing of left-branching versus right-branching sentences. A left-branching sentence is one in which an embedded clause interrupts the main clause. An example from a study comparing older

and younger adults by Kemper et al. (2004) is "That Joan stole the jewelry was a surprise" (p. 222). In this case, the phrase "That Joan stole the jewelry" is an embedded clause and it must be processed and held in working memory in order to interpret the sentence. An example (from the same study) of a right-branching sentence is "Tom saw who was robbing the store" (p. 222). In this latter case, the relative clause "who was robbing the store" is not embedded but placed in the direct object position where one would expect it. In general, the finding is that left-branching sentences make a greater processing demand on working memory in general, but that older adults versus younger adults are further disadvantaged in speed of comprehension and production of these forms (Kemper et al., 2004). Similarly, when pronouns and their antecedents are separated by greater distance, older adults have more difficulty than younger adults with texts.

These are laboratory studies, and some comments are necessary to contextualize them. First, even within the laboratory-based literature, there is some disagreement as to whether the automatic processing of syntax might differ from the controlled and conscious processing usually associated with working memory. Caplan and Waters (1999) argue that there is a "Specialized WM (working memory) system that supports the initial, on-line, obligatory, unconscious processes that assign the structure and the literal, preferred, discourse congruent meaning of sentences" (403–404), and this differs from working memory as usually conceived. This is an interesting proposal, particularly for bilingual processing of syntax in the second language, which should be more resource intensive even for this "specialized working memory" system. A second nuance to this work on syntactic processing and working memory is the fact that older adults show equivalent performance to younger adults when canonical sentence forms—common in everyday speech, outside the laboratory—are used (Kemper, Kynette, & Norman, 1992). Syntactically at least, older adults seem little different from younger adults in everyday speech.

Constructing the Text Base and Situation Model

Wingfield and Stine-Morrow (2000) summarize a number of areas in which older and younger adults are quite similar in their response to differences in text comprehension. One way in which texts differ is *propositional density.* A proposition, in its simplest sense, relates two or more concepts and represents the underlying meaning of a sentence, irrespective of surface linguistic features (Brown & Yule, 1983). More complex propositions relate multiple concepts, often in hierarchical relations. As propositions are multiplied in speech or text, propositional density is said to increase. Both younger and older adults show slower comprehension of texts with increased propositional density (Stine & Hindman, 1994). However, in production, older adults exhibit less propositional density than younger adults and require more processing time per proposition (Hartley, Stojack, Mushaney, Annon, & Lee, 1994). Also, although both younger and older adults have more difficulty comprehending speeded speech, older adults have a lower threshold than younger adults (Stine, Wingfield, & Poon, 1986). Again, these points may be particularly significant for bilingual performance in the second or nondominant language, where speed and propositional density are managed by the interlocutor.

Both in reading texts and following spoken discourse, individuals must construct and adjust particular mental models or representations of states-of-affairs that undergird meaning. For example, Hamm and Hasher (1992) provide a sample text in which a young woman does not feel well and wants to find out what is wrong. She goes to a large building where she hopes to find a book about her problem, finds one, and checks it out. Readers of this text typically generate the mental model of the woman going to a library. However, mental models require updating as new

information is imparted. Hamm and Hasher varied this story by providing an alternate version in which the young woman is not feeling well, *contacts a nurse friend for advice*, and then goes to a large building to find an answer. In this version, participants typically construct the model of the woman entering a hospital. As the story continues, however, and the woman finds and checks out a book, participants must update the incorrect "hospital" model and generate a "library" model.

Holding alternative models in working memory is resource intensive and can overload older adult processing. Thus, Hamm and Hasher (1992) found that older adults may not update their mental models with the same facility as younger adults. The authors suggest that older adults' inability to inhibit the prior interpretation drives their errors in updating the situation model. In another vein, some research finds that younger adults exhibit more reproductive recall for text while older adults exercise metaphoric or interpretive recall (Adams, Smith, Nyquist, & Perlmutter, 1997).

Discourse and Conversation

Typically, older adults versus younger adults show poorer *source memory* for where and from whom they obtained information. This difficulty is evidenced in multiparty conversations in which older adults may not remember who made which contribution (Rabbitt, 1981) or in older adults' poorer memory for topics of conversation (Kausler & Hakami, 1983). However, other research finds that the difference between older and younger adults in memory for prose is negligible if texts are narrative vs. expository in structure (Stine & Wingfield, 1990). This in turn may suggest that older adults make use of the contextual support provided by a predictable structure (narrative) in compensating for other linguistic or memory deficits (Wingfield & Stine-Morrow, 2000). As with other areas of speech production and comprehension, such compensatory strategies explain in large part why the speech of older adults in everyday circumstances is often unremarkably different from that of younger adults.

Summary: Cognitive Deficits and Monolingualism

A review of the literature in monolingual aging suggests a generalized, though incremental, decline in language processing and a particular pattern of age-related loss and preservation in linguistic skills. In particular, deficits are seen in lexical retrieval, though the structure of semantic memory remains largely untouched. Similarly, syntactic processing is affected primarily when complex structures overload working memory, and in fact older adults seem to produce simpler structures. As propositional density increases, and particularly as speech is speeded, older adults have more difficulty in comprehension, as measured either by their recall of idea-units or the sentence strings themselves. Finally, older adults suffer from deficits in source monitoring (e.g., tracking who said what in a conversation) more than younger adults. Again, these deficits are rarely critical in everyday life, as more top-down information and reliance on contextual supports compensate for age-related declines (Stine & Wingfield, 1987; Wingfield, Poon, Lombardi, & Lowe, 1985).

Bilingual Aging

Are the age-related declines observed among monolinguals the same for bilinguals? Is there a difference by language: will deficits be seen in one language but not the other? As it turns out, these are fairly complicated questions.

Factors Specific to Bilingualism

In cognitive terms, bilingualism is not simply the alternating deployment of two languages, as if speaking two languages were like measuring the world either in inches, feet, and miles *or* in centimeters, meters, and kilometers. Rather, the two languages of the bilingual are almost constantly active to one degree or another: they are interactive and they affect one another. [Francois Grosjean entitled an article "Neurolinguists beware! The bilingual is not two monolinguals in one person" (1989)]. Moreover, the languages of the bilingual are not static states. Rather, both first and second languages are subject to both growth and attrition. These dynamics introduce at least four new factors into psycholinguistic research: language proficiency, language environment, frequency of use, and attrition. Finally, the bilingual ability to switch from language to language is a cognitive ability never met with in the monolingual literature. The following discussion will explore these notions, after which a series of testable hypotheses will be generated to organize the few pieces of empirical research available about bilingualism and cognitive aging.

Language Attrition

Age-related losses in language processing may be reconceptualized as *language attrition*, and the monolingual case can be situated in a larger framework of which it is only one cell among many (Goral, 2004; Van Els, 1986). Language attrition, as usually studied by researchers in bilingualism, refers to the nonpathological loss of structural aspects of a language by an individual (Köpke, 2004; Schmid, Köpke, Keijzer, & Weilemar, 2004). Outside of aging studies, bilingual researchers almost always trace attrition to lack of contact with other speakers of the language in question. This is the language environment variable.

Language Environment

Age-related changes in language processing critically interact with differences in the amount of linguistic support engendered in particular *language environments*. For instance, on the one hand, language environment can be held constant, as in the very simple case of monolingual aging in which the monolingual experiences age-related changes in an environment that makes adjustments for his or her comprehension and production, for good or ill. Similarly, a "balanced bilingual" in a situation of societal bilingualism is in much the same situation, because for him or her, the language environment putatively provides equal support for both languages.

On the other hand, language environment can be different for either language, as in the case of the bilingual immigrant in a monolingual society. For older adult immigrants this latter situation can imply either negligible support for the native language (L1), in cases where the immigrant has little contact with compatriots, or alternately, little support for the second language (L2), in cases where the individual lives in a linguistically concentrated ethnic neighborhood (Schrauf, under review). In these latter cases, language proficiency and language dominance become important factors.

Language Proficiency

Broadly speaking, language *proficiency* refers to the level of attainment an individual has achieved, relative to the idealized "native" speaker. Generally, simultaneous bilinguals, who have learned

two or more languages from birth and who use these languages in their daily lives are presumed to have "native competence" in all of these languages. Second language learners often plateau (though not always, see Birdsong & Molis, 2001) during language learning and produce what second language acquisition researchers refer to as an *interlanguage*, a linguistic system situated at some point between the native language and the target language. This plateau effect is known as *fossilization*. Language proficiency is not a simple concept, however, and researchers in applied linguistics often employ the notion of communicative language ability to emphasize not only language knowledge, but knowledge about how to use language appropriately (Bachman & Palmer, 1996). In situations of immigration, individuals who learn a second language later in life often possess communicative competence in some domains but not others (Schrauf, 2002; under review). As a theoretical notion, language proficiency lies on a continuum between zero proficiency and "native-like" attainment.

Frequency of Use

Frequency of use is a straightforward concept that is difficult to measure. Practically, higher *frequency of use* translates into greater rehearsal. Cognitively, more frequent rehearsal predicts greater availability. Linguistically, more frequent rehearsal predicts language dominance. But frequency of use or language dominance is difficult to measure apart from self-report. Sometimes the language environment is used as a proxy.

Measuring and/or controlling for these variables—language proficiency, the effect of language environment, and frequency of use—is critically important in research on cognitive aging and bilingualism. For instance, to see if aging has differential effects on the language production and comprehension of bilinguals versus monolinguals, we need to compare fully fluent bilinguals with monolinguals, or else inadequate second language acquisition (fossilization) or language attrition in one or the other language may play a confounding role. If a bilingual never became very proficient in his or her L2 (lack of proficiency), or lives in a situation where either the L1 or L2 is never spoken or heard (unsupportive language environment), or simply never uses the L1 or L2 (infrequency of use), then our drawing conclusions about the effects of cognitive aging on his or her bilingualism is seriously compromised.

Hypotheses

Given these nuances, the available literature is organized around the following hypotheses:

1. Age-related patterns of decline and preservation will be seen in bilinguals just as they are seen in monolinguals.
2. Age-related patterns of decline and/or preservation will be the same in both languages for older bilinguals.
3. The unique language-switching ability of bilinguals plays a special role in bilingual aging.

Research designs in this literature concentrate on combinations of the following: age comparisons (young vs. old), status comparisons (bilinguals vs. monolinguals), and linguistic comparisons (L1 vs. L2). Variables requiring attention or control are language proficiency, language dominance, and language environment.

Hypothesis One: Age-Related Patterns of Decline and Preservation Will Be Seen in Bilinguals Just as They Are Seen in Monolinguals

This hypothesis compares monolingual comprehension and production with bilingual comprehension and production—momentarily leaving aside the possibility of differential production in either language. A generalized though incremental decline would be expected.

Speaking to this hypothesis, Juncos-Rabadan (1994a) administered the Bilingual Aphasia Test (Paradis, 1987) to 60 Galician-Spanish bilinguals in three age groups (30–40 years old, 50–59 years old, and 70–90 years old). The design facilitates looking at age and language as independent predictors of language outcomes. Concerning age specifically, participants in the oldest group scored lower than younger participants across both traditional language components (comprehension and production of phonology, morphology, lexicon, syntax, and semantics) and across typical language skills (comprehension, ability to repeat speech and text, judgment of appropriate lexical and grammatical forms, word-finding, and generation of propositions). These results point to a generalized decline in accord with the pattern seen in monolinguals.

Another study addressing differences between older bilinguals and monolinguals is that of Obler, Albert, and Lozowick (1986). These authors compared older Yiddish-English bilinguals with older English monolinguals to assess whether there were differences in the bilinguals' English versus the English of the monolinguals. They administered a battery of language and visuospatial tests in English to 11 older bilinguals (born of Yiddish-speaking parents in the United States) with a mean current age of 73.6, and 32 older English speaking monolinguals, with a mean age of 73.8. All bilingual participants were English dominant. Examples of tests included the following. In *picture naming*, an individual sees a picture of an object and must retrieve the name of that object from memory. Phonemic *word fluency* is measured by the number of words an individual can generate beginning with the letters *f* ' *a*, and *s*. The production of *antonyms* assessses word knowledge (e.g. *legal*, *illegal*). *Automatic speech* is tested by having an individual recite the months of the year (words that are held in memory as a series). *Semantic interference* was tested using the traditional Stroop test in which an individual sees a color word (e.g., *red*) printed in a particular color (e.g., green) and must name the color of the print and inhibit reading the word). Finally, participants were tested on their knowledge of *idiom and proverb meaning* (e.g., give the meaning of *loud tie* or *Rome wasn't built in a day*). In general, the bilinguals' performance in English was equivalent to the monolinguals' performance in English, with minor exceptions for certain domains (e.g., bilinguals were better than monolinguals in animal naming, monolinguals were better than bilinguals in automatic speech and proverbs). Although no results are reported for the bilinguals' Yiddish, this study does provide support for the notion that older bilinguals show little difference from older monolinguals in language processing.

Finally, Rosselli et al. (2000) tested for monolingual-bilingual differences in a sample of 81 older individuals (mean age 61.76 years), in three groups: 45 English monolinguals, 18 Spanish monolinguals, and 19 Spanish-English bilinguals. Bilingual proficiency in both languages was equated to monolingual proficiency using the Boston Naming Test. In addition, the authors divided the bilinguals into two groups according to age of acquisition of the second language: 9 participants learned English before age 12, and 10 after age 12. As in the Obler et al. (1986) study described earlier, fluency was tested by having participants generate words beginning with *f* ' *a*, and *s* (phonemic fluency) but also within the semantic categories *animals* and *fruits* (semantic fluency; see Spreen & Strauss, 1998 for descriptions of these neuropsychological tests). Participants provided descriptions of the Cookie Theft Picture from the Boston Diagnostic Aphasia Battery (Goodglass & Kaplan, 1983), which is a complex line drawing showing a kitchen scene of various

developing disasters (e.g., sink overflowing, child falling off a stool). Finally, participants completed the sentence repetition task from the Multilingual Aphasia Exam (Benton, Hamsher, & Sivan, 1989). Irrespective of proficiency grouping, no differences were found between bilinguals and monolinguals except in semantic fluency, and here the results were mixed, with bilinguals producing fewer fruits in Spanish and fewer animals in Spanish and in English. Bilinguals who learned English before age 12 showed no differences from monolinguals in repetition, naming, and picture description. Although no specific young-old comparison was made, this study leads to the conclusion that older bilinguals do not differ appreciably from older monolinguals in language processing.

In sum, the available evidence suggests that bilinguals experience the same kinds of age-related processing deficits as monolinguals.

Hypothesis Two: Age-Related Patterns of Decline and/or Preservation Will Be the Same in Both Languages for Older Bilinguals

This hypothesis tests whether age-related changes will be seen in both of the bilingual's languages equally or whether it will affect one language more than the other. Because the intent of this hypothesis is to test for effects of aging on performance in either language, any differences must exclude the confounding effects of underlying differences in proficiency or frequency of language use. Hence, participants must be screened for equal proficiency in both languages and frequency of use. Vis-à-vis this latter condition, the ideal situation would be one in which participants would report near-equal dominance in both languages (but questions about dominance are almost always posed and answered dichotomously). Not surprisingly, extant studies only variably meet this stringent criterion.

In the sole study addressing verbal/auditory deficits and bilingual aging, Xue, Hagstrom, and Hao (2002) tested whether differences in *speaking fundamental frequency* would be observed between languages of young adult bilinguals, and whether such differences would also be found among older adults. Speaking fundamental frequency is "the number of opening and closing movements of the vocal folds in 1 second" (Fabbro, 1999, p. 13), and it is measured in cycles per second (Hertz). Hangstrom and Hao (2002) reasoned that over time vocal characteristics would fossilize and both languages would come to share acoustic features. Equivalent spoken proficiency in English and Chinese of younger and older groups of bilinguals was established via clinical judgment by licensed speech pathologists. For the younger group of 23 Chinese-English bilinguals (mean age 28.32 years) a significantly lower minimum fundamental frequency in Chinese versus English was found, though maximum and fundamental frequency were equivalent in both languages. For the older group of 18 bilinguals (mean age 75.68 years), no differences were found between languages. The authors suggest that "the young speaker's personality modulates vocal acoustics during social use. The individualized use of voice becomes habitual over time and age, resulting in no differences in vocal parameters as seen in the elderly Chinese in this study" (p. 60). This study suggests an interaction of the effects of aging on the voicing mechanism and the languages of the bilingual such that the speaking fundamental frequencies in L1 and L2 come to resemble one another in older bilinguals more so than in younger bilinguals.

In a study of older English-Afrikaans bilinguals, de Picciotto and Friedland (2001) tested for differential performance on semantic fluency for animal names ("name as many animals as you can in one minute"). Each bilingual participated in three language conditions: (a) Afrikaans only, (b) English only, and (c) a mixed-bilingual condition. Thirty individuals with a mean age of 77

self-rated their proficiency between 4 and 5 (on a 5-point scale) and participated in each of the three conditions (repeated measures). No differences were found across the monolingual-bilingual modes, or across languages, either for numbers of exemplars generated overall or for numbers generated in clusters (e.g., pets, farm animals, etc). Variations in language-use over the years (self-reported percentages for each language) did not significantly correlate with outcomes. These results point to no differences in between-language performance among older bilinguals.

In a study of second language proficiency among older adults, De Bot and Lintsen (1986) compared older Dutch-German bilinguals in German with older Dutch-French bilinguals in French. They found superior performance by French versus German speakers on some subtests of the Bilingual Aphasia Test (repetition of words, grammatical transformation, sentence formation, and phonological fluency). Since both groups had similar amounts of instruction in their second languages, the authors suggest that these differences may have been due to more frequent travel to France on the part of the French speakers (hence suggesting a "language environment" effect on proficiency rather than an aging effect). However, no difference was found within groups on self-ratings of their "peak" proficiency (done retrospectively) and their ratings of their current proficiency, nor were there differences between groups on current self-rated proficiency.

Finally, the Juncos-Rabadan (1994a) study (summarized earlier) also tested for language differences between participants' Galician and Spanish—in a situation where proficiency and use were controlled for by the condition of societal bilingualism. However, despite participants' using both languages in daily life, their overall performance in Spanish was superior to Galician—in particular on 7 of the 21 subtests of the Bilingual Aphasia Test (verbal auditory discrimination, syntactic comprehension, grammaticality judgments, repetition of sentences, series, derivational morphology, and description). For instance, in *verbal auditory discrimination* the participant hears a word (e.g., *boat*) and must choose one picture from among four that represents the meaning of that word. Each of the four possible pictures represents a similar sounding word, for example, *coat*, *boat*, *moat*, *goat*. This tests a person's ability to make fine phonemic discriminations and comprehension of spoken words. In *derivational morphology* a participant hears a noun (e.g., *power*) and must produce its adjectival form (*powerful*). Participants must know the underlying morphological system of the language in order to produce the required response. Verbal auditory discrimination is a comprehension task and morphological derivation is a production task, but both concern morphosyntactic ability. Generally then, the Spanish-Galician bilinguals in this study performed better on morphosyntactic tasks in Spanish than in Galician. The authors speculated that the greater social prestige of Spanish versus Galician may account for better performance in Spanish. As noted in the previous discussion of this same study (under the first hypothesis of this section), the investigators found an effect of age, such that language abilities declined generally across age groups (30–40 year olds, 50–59 year olds, and 70–90 year olds), but here it is noteworthy that participants performed better in Spanish versus Galician across these groups as well. That is, decrements in abilities are seen in both languages in the same way from younger to older groups. (Interestingly, the study also points out the difficulty of finding a linguistic environment that would practically equalize language use within individuals).

In sum, what evidence is available suggests that when the bilingual is equally proficient in both languages, as in the case of *balanced bilingualism*, the same patterns of performance are observed. This suggests few differential effects of aging on L1 and L2 performance.

Hypothesis Three: The Unique Language-Switching Ability of Bilinguals Plays a Special Role in Bilingual Aging

In both comprehension and production, bilinguals regularly switch between languages. This ability is of particular interest for cognitive gerontologists because it is uniquely related to both executive control and inhibition—processes thought to deteriorate in normal aging. If the ability to switch appropriately from language to language, and to maintain that switch, deteriorates with age, then we should commonly see among older bilinguals an inability to maintain the language of the interlocutor in a conversation and/or reversion to the first language. Both these phenomena seem rare, except in the pathological case of dementia (Hyltenstam & Stroud, 1989; 1993; Mendez & Perryman, 1999; Schmidt, 1993–1994). Thus, either this ability is particularly resistant to decline, or perhaps, as a more exciting possibility, language switching acts as a protective factor against decline. In contrast to the neuropsychological testing literature surveyed thus far, research in this area is decidedly experimental.

Building on prior literature that finds that older adults are slower at task switching, Hernandez and Kohnert (1999) hypothesized that the bilingual's ability to switch between languages is a central executive task that would slow during normal aging. They compared older and younger adults on a picture naming task in English and Spanish in which participants had to name each picture in response to a spoken cue *in the language of the cue* (*diga* prompting a Spanish response, *say* prompting an English response). Trials were (a) blocked between languages (English blocks vs. Spanish blocks), (b) mixed by language within blocks with trials alternating between languages (Spanish trial followed by English trial followed by Spanish trial, etc), and mixed by language within blocks with random switches from language to language. All participants had learned both languages before 8 years of age, and all participants rated themselves as more proficient in English than Spanish. Thus, slower reaction times and higher error rates were observed for Spanish versus English across all conditions. More importantly, while all participants showed slower performance in mixed conditions (across languages), older adults were slower than younger adults, and made more errors than younger adults from blocked to mixed conditions. The authors argued that these results are consistent with a task set inertia hypothesis according to which older adults experience more difficulty in resisting the interference from the pattern of responding set up in prior trials. Further, these results support the notion that the efficiency of central executive processing deteriorates with age.

Another classic paradigm for assessing inhibition is the Stroop test in which an individual sees a color word (e.g., *red*) and must *name the color in which the word is printed* (e.g., *red* printed in blue ink). This requires inhibiting the overlearned response to read the word and requires instead that one name the color of the ink. The bilingual Stroop employs color words written in either language on separate trials. Zied et al. (2004) tested for age-related declines in inhibition among bilinguals by administering the bilingual version to 90 older and 90 younger Arabic-French bilinguals classified into three groups: balanced bilinguals, French-dominant, and Arabic-dominant. Proficiency was determined using the appropriate language versions of the Boston Naming Test. Not surprisingly, greater inhibitory deficits (slower reaction times, more errors) were seen for nondominant versus dominant languages, and declines in inhibition were seen from younger to older groups. This confirms the usual aging effect seen in monolinguals. However, in both younger and old groups, balanced bilinguals performed better (faster reaction times) than dominant bilinguals in either of the dominant bilinguals' languages. That is, for example, French-Arabic balanced bilinguals outperformed the Arabic dominant bilinguals *in Arabic*, the dominant language of the latter. This surprising result suggests that balanced bilingualism confers some advantage in

inhibitory control in verbal tasks both at younger and at older ages. Further, it opens the question whether nondominant languages might be more susceptible to age-related loss as a result of decreasing inhibition.

These two studies, the first involving picture naming, the second involving the bilingual Stroop Test, come to different, though not necessarily incompatible conclusions. Both show an age-related decline in inhibition. Both find this decline for language dominant bilinguals, but the latter study makes it possible to separate out balanced bilinguals, for whom the decline is less marked, from dominant (*unbalanced*) bilinguals. These experiments concern linguistic abilities (language switching) and linguistic responses (naming). The final experiment reviewed here asks how the linguistic ability of language switching might affect a nonverbal response.

In prior work, Bialystok (2001) found that bilingual children develop control processes more quickly than monolingual children, and she reasoned that maintaining control over two active languages required well-developed inhibitory control. Based on this research, Bialystok, Craik, Klein, and Viswanathan (2004) asked whether lifelong bilingualism might mitigate inhibitory declines in older adults. This differs from the two studies described in the previous paragraphs in that here the emphasis is not on language switching per se, but on whether a lifetime of language switching, as a kind of practiced executive control, will benefit older bilinguals over monolinguals *on a nonlinguistic task*. Across four experiments, Bialystok et al. (2004) had older and younger adults perform various versions of the Simon Task in which an individual sees colored squares on the computer screen and must press particular keys according to the colors of the squares. For instance, in the basic form of the Simon task, a participant sees a red or blue square on either the right or the left side of a computer screen and must press a designated key on the left if the square is blue, and a designated key on the right if the square is red. This requires that participants hold in mind the rule (e.g., left-key-if-blue, right-key-if-red) as the location of the square changes from the left to the right side of the screen. Bialystok at al. (2004) included more complicated versions of the task in order to challenge working memory capacity (e.g., using four colored squares and varying their position on the screen).

In general, results showed that bilinguals had better reaction times on critical trials than monolinguals. In particular, in versions of the Simon Task that overloaded working memory, older bilinguals outperformed monolinguals. In addition, when samples were further subdivided by age, bilinguals showed a constant advantage over monolinguals through age 60, whereupon the monolinguals showed an increased rate of slowing whereas the bilinguals maintained their advantage for another decade. In summary, life long bilingualism seems to offer some protection against commonly observed declines in executive control in later life.

Taken together, these experiments argue that, at least in the case of balanced bilinguals, language switching may confer particular cognitive benefits. To wit, the efficient language switching ability of the balanced bilingual may act as a protective factor against inhibitory deficits during the earlier years of old age.

Methodological Notes on Existing Studies on Bilingual Aging

In contrast to the literature on monolingual aging where experimental research abounds, the much smaller literature on bilingualism and aging is more reliant on neuropsychological testing. Thus, for instance, in the five studies grouped under the first two hypotheses, patterns of language preservation and loss were examined using common neuropsychological, clinical instruments such as the Bilingual Aphasia Test (Paradis, 1987), the Boston Naming Test (Kaplan, Goodglass, &

Weintraub, 1983), phonemic and semantic fluency (Spreen & Strauss, 1998), the Cookie Theft picture from the Boston Diagnostic Examination (Goodglass & Kaplan, 1983), and the Multilingual Aphasia Exam (Benton et al., 1989), among others. The use of such instruments raises complex questions about test translation and norming across linguistic contexts and in fact across age groups (Schrauf & Navarro, 2005; Schrauf, Weintraub, & Navarro, 2006). Some language instruments developed for clinical use are available and have been normed in many languages (the Bilingual Aphasia Test is available for 61 languages) while others are available for only a few. Some have been normed on older adults, some are weaker in this area (Lezak, 1995). Attention to these matters is critical when drawing conclusions about bilingual processing.

On the other hand, the research done on language-switching and aging, reviewed under the last hypothesis, is largely experimental in nature. Hernandez and Kohnert (1999) combined a picture naming task with a cue manipulation, Zied et al. (2004) used the bilingual Stroop in several conditions, and Bialystok et al. (2004) used the Simon Task. As is true in general, such studies are more effective in testing for causal factors. While the results from neuropsychological instruments has been valuable and informative for our understanding of bilingualism and aging, much more work needs to be done with explicitly experimental paradigms to identify and gauge the causal relations involved in multilingualism across the lifespan.

Explanatory Models and Age Effects on Second Language Processing

In this chapter, current models of cognitive aging (Park, 2000) have served as a framework to organize the available literature on bilingualism and aging. As noted, however, models of cognitive aging are themselves largely naïve about bilingualism, while, on the other hand, models of bilingual processing are largely naïve about aging. Models from both fields are ripe for cross-fertilizations however. Further, by examining models of bilingualism, we can begin to ask questions about aging and *second language* production and comprehension—where the languages are not both "first" languages. In the following paragraphs a description of one such model—the Activation Threshold Hypothesis (Paradis, 2004)—is summarized, and its implications for cognitive aging are explored.

Automatic and Controlled Processing

The majority of comparisons of the cognition of younger and older adults concerns tasks requiring controlled processing versus automatic processing. Briefly, mental tasks dependent on *automatic processes* are learned implicitly (without directed, conscious attention to learning) and repeated with sufficient frequency that they become programmed "chunks" of behavior that are executed very quickly and with a minimum expenditure of processing resources. Behaviors dependent on *controlled processing*, on the other hand, are learned explicitly and retrieved from memory in each instance of use in more piecemeal fashion. These are called controlled processes because at each instance of use they require attentional resources for assembly and production. A well-established finding in cognitive aging is that younger and older adults differ very little on tasks requiring automatic processing, whereas there are marked differences in tasks requiring controlled processing (Craik & Byrd, 1982; Park et al., 1996; Titov & Knight, 1997). The four theories reviewed at the beginning of this chapter (slowed processing speed, shrinking working memory, inhibitory

deficits, and declining sensory function) concern primarily these age-related differences in controlled processing.

The Activation Threshold Hypothesis (ATH)

The Activation Threshold Hypothesis (Paradis, 2004) is a neurolinguistic model of bilingualism according to which a mental item or mental representation (phonological form, word or phrase, syntactic construction, situation model, etc.) is activated by a summing of impulses. With each activation, the threshold of that item is lowered and then gradually rises again. Items that are frequently or recently activated have lower thresholds than infrequently or remotely activated items. These dynamics partially explain the effects, for instance, of immigrant first language attrition in a new language environment in which there are no opportunities to speak the first language. In this case, both infrequency of use and gradual distancing in time raise the activation thresholds of first language items and render them less and less accessible. The theory also suggests why language production is more difficult than language comprehension because in comprehension, excitatory impulses are triggered by the environment (e.g., other speakers, TV, billboards, etc.), whereas in production, they must come from within. As noted previously, in studies of monolingual aging, production is more resource intensive than comprehension, and hence differences between younger and old will be more apparent in production than comprehension.

In the ATH model, distinctions between *implicit memory* and *explicit memory* and between automatic and controlled processes are applied to the further distinction between *language acquisition* and *language learning* (Paradis, 2004; chapter 2). Language acquisition usually refers to first language(s) where language representations and language skills are encoded into memory incidentally while the acquirer attends to other things in the environment. This is implicit learning, resulting in implicit memory—in which conscious access to the learned material is not possible. Thus, for example, a native speaker of English is probably entirely incapable of thinking about verb tenses while simultaneously telling a story from his or her past. In fact, the effort to interrupt the automatic process of on-line syntactic construction would disrupt the flow of speech. Though cognitive processes generally require both automatic *and* controlled processes (Jacoby, 1991), the amount of automaticity in first language production is relatively high.

Language learning, on the other hand, refers to the more effortful and conscious effort associated with second languages. In this latter case, for example, rules are learned explicitly (encoded into long-term memory) and then reloaded into working memory for application when the individual speaks. So, for example, a second language speaker of Spanish is usually quite capable of simultaneously telling a story in Spanish while selecting *at some level of awareness* the appropriate form of the simple past versus the imperfect past tense verb for each sentence. Consequently, the speaker's second language speech may be slower (more or less, depending on proficiency) than speech in his or her first language. Relatively speaking, then, second languages rely far more on controlled processes, though over time procedural memory takes over and little conscious thought is needed for production.

In second languages, individuals often retain memory—explicit memory—for the rules and mental representations that they have learned. Of course, as computational procedures develop below awareness for these behaviors (automatic processing), speakers become more fluent and pay little attention, for example, to the selection of grammatical form or appropriate phrasing or tone of voice. Nevertheless, in second language speech, speakers can suspend automatic processes and consciously implement explicit rules to guide their speech, for example, when an individual

carefully attends to the distinctions in past tense verbs when giving an eyewitness account of an accident to the police. In these situations, as Paradis (2004) points out, "Controlled processing is vulnerable to the effects of a concomitant memory load, whereas automatic processing is not affected by such cognitive demands" (p. 42).

In summary, second language speakers rely far more extensively on controlled processing in producing and comprehending their second versus their first language. In one of his more striking assertions, Paradis suggests that it is an empirical question whether "Observed fluency in a late-learned L2 is not simply the result of speeded-up controlled processes" (p. 47). That is, it is entirely possible that the fluid second language speech of the late bilingual still derives wholly from highly practiced, very fast controlled processing.

Effects of Aging on Second Languages

How might cognitive aging affect bilingual processing in this model? Obviously, as cognitive resources diminish with aging, controlled processing in general bears more the brunt of change than automatic processing. Given that cognitive acts often involve both automatic *and* controlled processing, the traditional language components can be ordered from those in which automatic processing accounts for relatively more task performance to those in which controlled processing accounts for most task performance. Figure 5.1 represents this ordering along the x-axis, from most to least automatic processing running from phonology, morphosyntax, lexicon-semantic processes, pragmatics, to discourse. Parallel horizontal lines represent the hypothetical distribution of first versus second language components according to how much automatic versus controlled processing is required. Though subject to empirical validation, this figure displays where and how differences in processing might be located in first and second languages. As aging affects controlled processing more than automatic processing, one would expect a greater relative deficit in each second language component in comparison to its corresponding first language component.

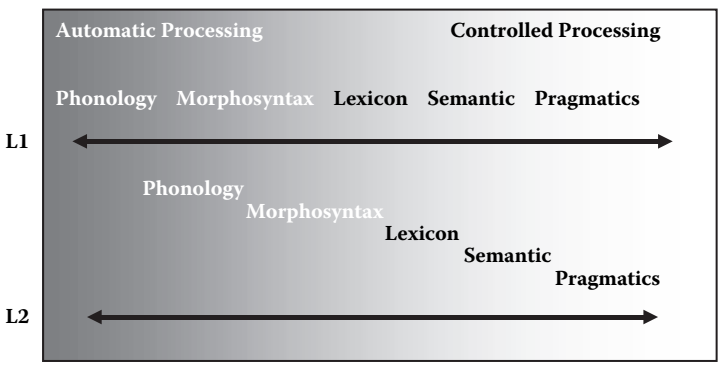

Figure 5.1 Processing chart.

Slowed Processing Speed

At the beginning of this chapter, four theories explaining differential cognitive performance between younger and older adults were mentioned: slowed processing speed, shrinking working memory, inhibitory deficits, and declining sensory function. Reading each of these into this model makes specific predictions about aging effects on language processing of second languages. Not surprisingly, the effect of slowed processing speed in tasks requiring controlled processing predicts that older adults will be slower in their second languages than younger adults in their second languages (where L2 proficiency is equated in both groups).

Shrinking Working Memory

The second theory of cognitive aging concerned diminished working memory capacity. Relative to working memory, as Paradis (2004) points out, speech tasks requiring controlled processing are affected by concomitant memory loads. Thus, for example, the older immigrant speaking English as her L2 and receiving complicated medication directions from her pharmacist may experience more difficulties in her English than usual since she must both maintain the conversation in English *and* hold in mind unfamiliar medication information. Further, one would predict complicated interactions between greater and lesser resource intensive language components (between those on the right and those on the left of Figure 5.1). For instance, the older immigrant speaker of English who is talking to the hot dog vendor at a ball park may be concentrating on portraying himself as an accomplished user of baseball terminology, yet find his sentences sounding even less native-like than usual. Overloading working memory with a pragmatic issue (sensitivity to the "baseball" register) may disrupt controlled processing of morphosyntactic constructions. Again, holding L2 proficiency constant across groups of young and old, one would expect greater deficits in older adults' than younger adults' performance in these kinds of speech performances.

This situation is further complicated by the interaction between deficits in speed and working memory—what Salthouse (1996) calls the "simultaneity mechanism." This occurs when material held in working memory drops out before further information downstream can be processed. For example, in languages with gendered nouns, the noun subject of a sentence may require that a much later reference in the sentence agree with it in gender. For an older, late learner of the language, holding this gender information in memory over the course of a long sentence can be much more problematic than for a younger, late learner. For these reasons, one would also predict that older adults versus younger adults will have specific difficulties with language learning (and may well employ very different cognitive strategies than younger adults).

Inhibitory Deficits

The third theory of cognitive aging concerned the older individual's decreasing ability to inhibit irrelevant information during effortful processing. Age-related inhibitory deficits should also affect the controlled processing of second languages among older versus younger adults. Something of this is seen in the Zied et al. study (2004) discussed earlier. As indicated, Zied et al. found superior processing for balanced bilinguals, but in addition, they also found that interactions between age and language-dominant bilinguals were significant. Older dominant bilinguals were slower in both their nondominant and dominant languages than were younger bilinguals. That is, longer

reaction times and greater numbers of errors on the bilingual Stroop task suggest a generalized effect of inhibitory deficits in second languages as well as first languages. Many similar predictions could be made about the series of language components portrayed in Figure 5.1. For instance, the issue of reversion to the first language, variably observed in normal aging (Clyne, 1977) and in dementia (Mendez & Perryman, 1999; Schmidt, 1993–1994), may be explained in part by the inhibitory deficits in cognitive aging.

Declining Sensory Function

Finally, the fourth theory of cognitive aging suggests that cognitive deficits are caused by declining sensitivity in sensory functions and that this decline itself reflects general neurobiological deterioration. This raises the issue of how deficits in bilingual processing might be traced to brain specific mechanisms associated with aging and the use of imaging techniques covered elsewhere in this volume (see chapters by Vaid and Marian). Applications to bilingual aging have yet to be explored.

Summary and Conclusion

Explanatory theories in cognitive aging trace impaired cognitive processing in older adults to combinations of four mechanisms: (a) slowed processing speed, (b) shrinking working memory, (c) inhibitory deficits, and (d) declining sensory function. These theories are variously applied in the literature on monolingual aging to explain a range of language deficits, though, importantly, such deficits do not appreciably disadvantage older adults due to strategic compensation. The most common complaint of older adults is word-finding (lexical retrieval), probably due to the inability to inhibit competitors for selection at the moment of retrieval. In syntactic production, older adults prefer simpler constructions and sometimes have difficulty in comprehending sentences requiring a high working memory load. Similarly, texts (spoken or written) that involve high propositional density also seem to overload working memory. In discourse and conversation, older adults may have difficulty tracking both topics and speakers, but generally they compensate by taking advantage of linguistic and social contextual factors.

Research on bilingual cognitive aging is fairly sparse. Such investigations are made more complex by the necessity of controlling for levels of language proficiency, the language environment, language dominance, and language attrition—though this is true of all research on bilingualism. Currently available research provides support for three hypotheses. First, the age-related patterns of decline and preservation seen in monolingual aging are similar in bilingual aging. That is, research on young versus old bilinguals, generally using clinical neuropsychological tests of function, show similar deficits among older and younger bilinguals. Second, the age-related patterns of decline and/or preservation are substantially the same in both of the bilinguals' languages, in the case where bilinguals have equivalent proficiency in both languages. Again, the majority of this work has been done using clinical instruments. Third, some very recent work suggests that balanced bilingualism, including constant language-switching across the lifespan may act as a protective factor against declines in executive functions normally seen in monolingual aging. This argues for special effects of language-switching on cognitive aging.

The available research on aging and bilingual processing generally focuses on balanced bilingualism where both of the bilingual's languages are essentially "first" languages. Little attention has been paid to aging and second languages, where the second language is learned after the first.

Nevertheless, existing theories about second language acquisition and processing *could* make specific predictions about bilingualism and aging. A consideration of one such model, the Activation Threshold Hypothesis (Paradis, 2004) generates a series of testable hypotheses about aging and the second languages of the bilingual. This theory suggests that second languages, in general, require more controlled processing. If we decompose language into its component tasks, these too may be ordered by processing demands. Thus, phonological production or morphosyntactic construction involve relatively more automatic processing while lexical retrieval or discourse skills require relatively more controlled processing. Given the twin findings in cognitive aging of (a) age invariance on tasks requiring automatic processing, and (b) age deficits for older adults on tasks requiring controlled processing, it is logical to predict that second language tasks are more vulnerable to age-related declines than first language tasks. Slowed processing speed, shrinking working memory, inhibitory deficits, and declining sensory functions generate specific predictions about how second languages will fare in late life.

List of Key Words

Activation Threshold Hypothesis, Anaphoric reference, Automatic processing, Automatic speech, Balanced bilingualism, bilingual Aphasia Test, Boston Diagnostic Aphasia Battery, Central executive, Cookie theft picture, Confrontational naming, Controlled processing, Derivational morphology, Declining sensory function, Explicit memory, Fossilization, Gating Techniques, Implicit memory, Inhibition, Inhibitory deficits, Language acquisition, Language attrition, Language environment, Language learning, Picture naming, Presbycussis, Processing speed, Propositional density, Semantic interference, Semantic priming, Shrinking working memory, Simon task, Situation model, Slowed processing speed, Source memory, Speaking fundamental frequency, Stroop test, Syntactic processing, Tip-of-the-tongue phenomenon, Verbal auditory discrimination, Word fluency, Working memory

Internet Sites Related to Bilingualism and Aging

Aging and Bilingualism: http://www.webmd.com/content/article/88/100087.htm

Bilingualism and Cognitive Development: http://www.psych.yorku.ca/ellenb/research/research_areas/research_areas.htm

Bilingualism and the Brain: http://news.bbc.co.uk/2/hi/health/3794479.stm

Cognitive Aging Group: http://chb.syr.edu/projects/CAG/

Institute for the Study of Aging: http://www.aging-institute.org/grant_fundingp.htm

Journal of Gerontology: http://psychsoc.gerontologyjournals.org/

National Resource Center on Nutrition, Physical Activity and Aging: http://www.cbc.ca/story/science/national/2004/06/14/bilingual040614.html

Speech and Hearing Sciences: http://web.gc.cuny.edu/Speechandhearing/labs/nl/Lab%20Personnel.htm

Discussion Questions

1. One finding in monolingual aging is that left-branching sentences are harder to process than right-branching sentences. But some languages (e.g., Japanese) are classically left branching. Would speakers of Japanese experience more age-related deficits in speech production than speakers of English?
2. To some extent the accessibility of either of the bilingual's languages depends on frequency of use. How might studies be designed that would separate out the effects of cognitive aging on second language attrition and the effects of frequency of use?
3. Given that the bilingual's nondominant language might be more susceptible to decline than his or her dominant language, what would you predict for third and fourth languages?
4. If controlled processes are particularly affected by aging, and if second languages are more affected by losses in controlled processing than first languages, why doesn't every older bilingual eventually lose his or her second language and revert to the first language?
5. Given the four mechanisms accounting for age differences in cognitive processing discussed in this chapter, how might older adults compensate for these deficits in processing when learning a second language?
6. How can an individual attend to correct verb forms in a second language while simultaneously speaking that language? How does this skill relate to the language-switching skill of bilinguals? Would a lifetime of doing this "language-attending" lead to better executive control for the bilingual versus the monolingual?

Suggested Research Project

Design an experiment that would test in the laboratory the assertion made in the chapter that an older immigrant speaking English as her L2 and receiving complicated medication directions from her pharmacist would experience more difficulties in her English than usual since she must both maintain the conversation in English *and* hold in mind unfamiliar medication information.

Suggested Readings

Wingfield, A, & Stine-Morrow, E. A. L. (2000). Language and speech. In. F. I . M. Craik & T. A. Salthouse (Eds.), *The handbook of aging and cognition* (2nd ed., pp. 359–416). Mahwah, NJ: Lawrence Erlbaum Associates.

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References

Adams, C., Smith, M. C., Nyquist, L., & Perlmutter, M. (1997). Adult age-group differences in recall for the literal and interpretive meanings of narrative text. *Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 52B*(4), P187–P195.

Au, R., Joung, P., Nicholas, M., Kass, R., Obler, L. K., & Albert, M. L. (1995). Naming ability across the lifespan. *Aging and Cognition, 2*, 300–311.

Bachman, L. F., & Palmer, A. S. (1996). *Language testing in practice*. Oxford: Oxford University Press.

Baddeley, A. D. (1986). *Working memory*. Oxford: Clarendon Press.

Baltes, P. B., & Lindenberger, U. (1997). Emergence of powerful connection between sensory and cognitive functions across the adult lifespan: A new window to the study of cognition. *Psychology & Aging, 12*, 12–21.

Beasley, D. S., & Davis, G. A. (Eds.). (1981). *Aging: communication processes and disorders*. New York: Grune & Stratton.

Benton, A. L., Hamsher, K., & Sivan, A. (1989). *Multilingual aphasia examination* (3rd ed.). Lutz, FL: Psychological Assessment Resources.

Bergman, M. (1980). *Aging and the perception of speech*. Baltimore: University Park Press.

Bialystok, E. (2001). *Bilingualism in development: Language, literacy, and cognition*. Cambridge: Cambridge University Press.

Bialystok, E., Craik, F. I. M., Klein, R., & Viswanathan, M. (2004). Bilingualism, aging, and cognitive control: Evidence from the Simon Task. *Psychology and Aging, 19*(2), 290–303.

Birdsong, D., & Molis, M. (2001). On the evidence for maturational constraints in second-language acquisition. *Journal of Memory and Language, 44*, 235–249.

Brown, G., & Yule, G. (1983). *Discourse analysis*. New York: Cambridge University Press.

Burke, D. M., Locantore, J. K., Austin, A. A., & Chae, B. (2004). Cherry pit primes Brad Pitt: Homophone priming effects on young and old adults' production of proper names. *Psychological Science, 15*(3), 164–170.

Burke, D. M., MacKay, D. G., & James, L. E. (2000). Theoretical approaches to language and aging. In T. J. Perfect & E. A. Maylor (Eds.), *Models of cognitive aging* (pp. 204–237). New York: Oxford University Press.

Burke, D. M., MacKay, D. G., Worthley, J. S., & Wade, E. (1991). On the tip of the tongue: What causes word finding failures in younger and older adults. *Journal of Memory and Language, 30*, 542–579.

Caplan, D., & Waters, G. S. (1999). Verbal working memory and sentence comprehension. *Behavioral and Brain-Sciences, 22*(1), 77–126.

Cerella, J. (1985). Information processing rates in the elderly. *Psychological Bulletin, 98*, 67–83.

Clyne, M. (1977). Bilingualism of the elderly. *Talanya, 4*, 45–56.

Craik, F. I. M., & Byrd, M. (1982). Aging and cognitive deficits: The role of attentional resources. In F. I. M. Craik & S. Trehub (Eds.), *Aging and cognitive processes* (pp. 191–211). New York: Plenum Press.

De Bot, K., & Lintsen, T. (1986). Foreign-language production in the elderly. In B. Weltens, K. De Bot & T. Van Els (Eds.), *Language attrition in progress* (pp. 131–142). Dordrecht: Foris.

de Picciotto, J. & Friedland, D. (2001). Verbal fluency in elderly bilingual speakers: Normative data and preliminary application to Alzheimer's disease. *Folia Phoniatrica et Logopaedica, 53*, 145–152.

Duchek, J. M., & Balota, D. A. (1993). Sparing activation processes in older adults. In J. Cerella, J. M. Rybash, W. Hoyer, & M. L. Commons (Eds.), *Adult information processing: Limits on loss*. San Diego, CA: Academic Press.

Fabbro, F. (1999). *The neurolinguistics of bilingualism: An introduction*. East Sussex, UK: Psychology Press.

Feyereisan, P. (1997). A meta-analytic procedure shows an age-related decline in picture-naming: Comments on Goulet, Ska, and Kahn. *Journal of Speech and Hearing Research, 40*, 1328–1333.

Goodglass, H., & Kaplan, B. (1983). *The assessment of aphasia and related disorders* (2nd ed. Vol. Lea & Febiger). Philadelphia.

Goral, M. (2004). First-language decline in healthy aging: Implications for attrition in bilingualism. *Journal of Neurolinguistics, 17*, 31–52.

Grosjean, F. (1989). Neurolinguists Beware! The Bilingual is Not Two Monolinguals in One Person. *Brain and Language, 36*, 3–15.

Grosjean, F. (1996). Gating. *Language and Cognitive Processes, 11*, 597–604.
Hamm, V. P., & Hasher, L. (1992). Age and the availability of inferences. *Psychology & Aging, 7*, 56–64.
Hartley, J. T., Stojack, C. C., Mushaney, T. J., Annon, T. A. K., & Lee, D. W. (1994). Reading speed and prose memory in older and younger adults. *Psychology & Aging, 7*, 56–64.
Hasher, L., & Zacks, R. T. (1988). Working memory, comprehension, and aging: A review and a new view. In G. H. Bower (Ed.), *The psychology of learning and motivation* (Vol. 22, pp. 193–225). San Diego, CA: Academic Press.
Hernandez, A. E., & Kohnert, K. J. (1999). Aging and language switching in bilinguals. *Aging in Neuropsychology and Cognition, 6*(2), 69–83.
Hyltenstam, K., & Stroud, C. (1989). Bilingualism in Alzheimer's dementia: Two Case Studies. In K. Hylenstam & L. K. Obler (Eds.), *Bilingualism Across the Lifespan: Aspects of Acquisition, Maturity, and Loss* (pp. 202–227). Cambridge: Cambridge University Press.
Hyltenstam, K., & Stroud, C. (1993). Second language regression in Alzheimer's dementia. In K. Hyltenstam & A. Viberg (Eds.), *Progression and regression in language: Sociocultural, neuropsychological and linguistic perspectives* (pp. 222–242). Cambridge: Cambridge University Press.
Jacoby, L. L. (1991). A process dissociation framework: Separating automatic from intentional uses of memory. *Journal of Memory and Language, 30*, 513–541.
Juncos-Rabadan, O. (1994a). The assessment of bilingualism in normal aging with the bilingual aphasia test. *Journal of Neurolinguistics, 8*(1), 67–73.
Juncos-Rabadan, O. (1994b). Decline in the elderly's language: Evidence from cross-linguistic data. *Journal of Neurolinguistics, 8*(3), 183–190.
Just, M. A., & Carpenter, P. A. (1992). A capacity theory of comprehension: Individual differences in working memory. *Psychological Review, 99*, 122–149.
Kaplan, E., Goodglass, H., & Weintraub, S. (1983). *Boston Naming Test*. Philadelphia: Lee & Febiger.
Kausler, D. H., & Hakami, M. K. (1983). Memory for topics of conversation: Adult age differences and intentionality. *Experimental Aging Research, 9*, 153–157.
Kemper, S. (1987a). Life-span changes in syntactic complexity. *Journal of Gerontology, 42*, 323–328.
Kemper, S. (1987b). Syntactic complexity and older adult's prose recall. *Experimental Aging Research, 13*, 47–52.
Kemper, S., Greiner, L. H., Marquis, J. G., Prenovost, K., & Mitzner, T. L. (2001). Language decline across the lifespan: Findings from the Nun Study. *Psychology and Aging, 16*(2), 227–239.
Kemper, S., Herman, R.E., Liu, C. J. (2004). Sentence production by younger and older adults in controlled contexts. *Journals of Gerontology: Psychological Sciences, 58B*, P220–P224.
Kemper, S., Kynette, D., & Norman, S. (1992). Age differences in spoken language. In R. West & J. Sinnott (Eds.), *Everyday memory and aging* (pp. 138–152). New York: Springer.
Kemper, S., Thompson, M., & Marquis, J. G. (2001). Longitudinal change in language production: Effects of aging and dementia on grammatical complexity and propositional content. *Psychology and Aging, 16,* 600–614.
Köpke, B. (2004). Neurolinguistic aspects of attrition. *Journal of Neurolinguistics, 17*, 3–30.
Kynette, D., & Kemper, S. (1986). Aging and the loss of grammatical forms: A cross-sectional study of language performance. *Language-and-Communication, 6*(1–2), 65–72.
Laver, B., & Burke, H. R. (1993). Why do semantic priming effects increase in old age? A meta-analysis. *Psychology & Aging, 8*, 34–43.
Lezak, M. D. (1995). *Neuropsychological assessment* (3rd ed.). New York: Oxford University Press.
Light, L. L., Capps, J. L., Singh, A., & Owens, S. A. A. (1993). Comprehension and use of anaphoric devices in younger and older adults. *Discourse Processes, 18*, 77–104.
Mendez, M. F., & Perryman, K. M. (1999). Bilingualism and dementia. *Journal of Neuropsychiatry and Clinical Neurosciences, 11*(3), 411–412.
Obler, L., Albert, M., & Lozowick, S. (1986). The aging bilingual. In J. Vaid (Ed.), *Language processing in bilinguals: Psycholinguistic and neuropsychological perspectives* (pp. 221–231). Hillsdale, NJ: Lawrence Erlbaum Associates.

Paradis, M. (1987). *The assessment of bilingual aphasia*. Hillsdale, NJ: Lawrence Erlbaum Associates.
Paradis, M. (2004). *A neurolinguistic theory of bilingualism*. Philadelphia: John Benjamins.
Park, D. C. (2000). The basic mechanisms accounting for age-related decline in cognitive function. In D. C. Park & N. Schwarz (Eds.), *Cognitive aging: A primer* (pp. 1–21). Philadelphia: Psychology Press.
Park, D. C., Smith, A. D., Lautenschlager, G., Earles, J., Frieske, D., Zwahr, M., et al. (1996). Mediators of long-term memory performance across the lifespan. *Psychology and Aging, 11*, 621–637.
Rabbitt, P. (1981). Talking to the old. *New Society, 55*, 140–141.
Rabbitt, P., Maylor, E. A., Mcinnes, L., Bent, N., & Moore, B. (1995). What goods can self-assessment questionnaires deliver for cognitive gerontology? *Applied Cognitive Psychology, 9*, S127–152.
Rosselli, M., Ardila, A., Araujo, K., Weekes, V. A., Caracciolo, V., Padilla, M., et al. (2000). Verbal fluency and repetition skills in healthy older Spanish-English bilinguals. *Applied Neuropsychology, 7*(1), 17–24.
Ryan, E. B. (1990). Normal aging and language. In R. Lubinski, J. B. Orange, D. Henderson & N. Stecker (Eds.), *Dementia and communication*. Philadelphia: B.C. Decker.
Salthouse, T. A. (1996). The processing-speed theory of adult age differences in cognition. *Psychological Review, 103*, 403–428.
Schmid, M. S., Köpke, B., Keijzer, M., & Weilemar, L. (Eds.). (2004). *First language attrition: Interdisciplinary perspectives on methodological issues*. Amsterdam: John Benjamins.
Schmidt, R. (1993–1994). Linguistic reversal in Alzheimer's disease patients. *The Journal of Long Term Care Administration, Winter*, 34–39.
Schrauf, R. W. (2002). Comparing cultures within subjects: A cognitive account of acculturation as a framework for cross-cultural study. *Anthropological Theory, 2*(1), 101–118.
Schrauf, R. W. (under review). *English among older immigrants in linguistically isolated neighborhoods: Proficiency and patterns of use*.
Schrauf, R. W., & E. Navarro (2005). Using existing tests and scales in the field. *Field Methods 17*(4): 373-393.
Schrauf, R. W., Weintraub, S., & Navarro, E. (2006). Is a validation of the word accentuation test (WAT) of premorbid intelligence necessary for use among older, Spanish-speaking immigrants in the United States? *Journal of the International Neuropsychological Society, 12*, 391–399.
Spreen, O., & Strauss, E. (1998). *A compendium of neuropsychological tests* (2nd ed.). New York: Oxford University Press.
Stine, E. A. L., & Hindman, J. (1994). Age differences in reading time allocation for propositionally dense sentences. *Aging and Cognition, 1*, 2–16.
Stine, E. A. L., & Wingfield, A. (1987). Process and strategy in memory for speech among younger and older adults. *Psychology and Aging 2(3)*, 272–279.
Stine, E. A. L., & Wingfield, A. (1990). The assessment of qualitative age-differences in discourse processing. In T. M. Hess (Ed.), *Aging and cognition: Knowledge organization and utilization* (pp. 33–92). New York: Elsevier.
Stine, E. A. L., Wingfield, A., & Poon, L. W. (1986). How much and how fast: Rapid processing of spoken language in later adulthood. *Psychology & Aging, 1*, 303–311.
Titov, N., & Knight, R. G. (1997). Adult age differences in controlled and automatic processing. *Psychology & Aging, 12*(4), 565–573.
Tulving, E., & Pearlstone, Z. (1966). Availability versus accessibility of information in memory for words. *Journal of Verbal Learning and Verbal Behavior, 5*, 381–391.
Tun, P. A., & Wingfield, A. (1999). Language and communication: Fundamentals of speech communication and language processing in old age. In A. D. Fisk & W. A. Rogers (Eds.), *Handbook of human factors and the older adult* (pp. 125–149). New York: Academic Press.
Van Els, T. (1986). An overview of European research on language attrition. In B. Weltens, K. De Bot, & T. Van Els (Eds.), *Language attrition in progress* (pp. 3–18). Dordrecht: Foris.

Wingfield, A. (2000). Speech perception and the comprehension of spoken language in adult aging. In D. C. Park & N. Schwarz (Eds.), *Cognitive aging: A primer* (pp. 175–195). Philadelphia: Psychology Press.

Wingfield, A., Aberdeen, J. S., & Stine, E. A. L. (1991). Word onset gating and linguistic context in spoken word recognition by young and elderly adults. *Journal of Gerontology: Psychological Sciences, 46*, P127–P129.

Wingfield, A., Poon, L. W., et al. (1985). Speed of processing in normal aging: Effects of speech rate, linguistic structure, and processing time. *Journal of Gerontology 40*, 579–585.

Wingfield, A., & Stine-Morrow, E. A. L. (2000). Language and speech. In F. I. M. Craik & T. A. Salthouse (Eds.), *The handbook of aging and cognition* (2nd ed., pp. 359–416). Mahwah, NJ: Lawrence Erlbaum Associates.

Xue, S. A., Hagstrom, F., & Hao, J. (2002). Speaking fundamental frequency characteristics of young and elderly bilingual Chinese-English speakers: A functional system approach. *Asia Journal of Speech, Language, and Hearing, 7*, 55–62.

Zied, K. M., Phillipe, A., Karine, P., Harvet-Thompson, V., Ghsilaine, A., Arnaud, R., et al. (2004). Bilingualism and adult differences in inhibitory mechanisms: Evidence from a bilingual stroop task. *Brain and Cognition, 54*, 254–256.

Chapter 6

The Bilingual Brain: What Is Right and What Is Left?

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From early case reports of selective loss or recovery of language in bilinguals with brain injury due to a stroke or head trauma to recent brain mapping studies, claims about the neural underpinnings of bilingualism have generated much interest and much controversy. At issue in both clinical and experimental studies of *the bilingual brain* is whether or when there may be distinct neural correlates of multiple language experience. For example, are separate brain regions recruited in the learning of a second language (L2) than are used for the first language (L1)? Alternatively, is there different neural circuitry associated with speaking in more than one language than in speaking in a single language? Such questions have generated a sizeable number of studies (see Fabbro, 2001; Ijalba, Obler, & Chengappa, 2004; Paradis, 2001, 2004; Vaid, 2002; Vaid & Genesee, 1980; Hull & Vaid, 2005; Vaid & Hall, 1991, for reviews and further discussion).

In this chapter we will take stock of what we know about the bilingual brain and what remains to be explored. We will begin by considering how the bilingual brain came to be studied and why it is of theoretical interest. Next, we will examine the different available sources of evidence on this topic, and consider their relative merits and limitations. We will then discuss points of convergence or divergence across different studies. In concluding, we will suggest that further studies on this topic will benefit from a joint consideration of cognitive and neurocognitive approaches and from research designs that explicitly acknowledge rather than conceal the diversity of bilingual language experience.

Why the Bilingual Brain?

The study of language and the brain has been guided by a prevailing assumption that the prototypical language user is monolingual. This assumption is unfounded, given that, on a global level, there at least as many and probably more bilingual and/or multilingual language users than there are single language users (see Cook, this volume). Thus, one reason to study the bilingual brain is simply to understand how language is acquired, processed and represented among users who constitute the majority of language users. However, apart from the intrinsic importance and necessity of basic research on bilingual populations, investigation of the bilingual brain is also important for its theoretical significance in terms of what it can tell us about neural responsivity to variations in language experience. Just as it is known that variations in early sensory experience (e.g., congenital deafness or blindness) affect brain organization (Neville & Bavelier, 2002; Newport, Bavelier, & Neville, 2001), it is plausible that variations in language experience may also alter brain organization. Bilingualism may be thought of as a rich source of a variety of language experiences: apart from knowing more than one language, bilingual individuals vary considerably in such respects as when a language is acquired, the context or manner of language acquisition, and the degree of proficiency in a language. Bilingualism, thus, provides a fertile testing ground for questions about neural flexibility, or brain plasticity.

The earliest research on language and the brain in multiple language users dates back to the late 1880s, and took the form of case studies by neurologists of aphasia, or language impairment following cortical damage to one side of the brain, typically the left hemisphere. These case studies document a variety of patterns of impairment and recovery following aphasia in multilingual (or *polyglot*) patients, including selective aphasia, where only one language is impaired, differential impairment, where the languages show different types of impairment, or successive impairment, where only one language is initially impaired but then another language is impaired. However, since most of these case studies were published in neurological outlets, often in languages other than English, it was not until fairly recently that this literature became more widely known within linguistics and psychology thanks largely to two seminal publications (see Albert & Obler, 1978; Paradis, 1983).

Findings of differential language impairment in polyglot aphasia hinted at the importance of language acquisition history as a possible mediator of neural organization of language. In a direct examination of this variable, Lambert and Fillenbaum (1959) noted that aphasics who had acquired their two languages in similar contexts tended to show parallel deficits across their languages, whereas those who had acquired their languages at different periods and in different settings tended to show differential language impairment. Such an outcome was consistent with psychological studies of bilingualism indicating that bilinguals who had acquired their two languages simultaneously and in similar contexts tended to show linguistic interdependence (relatedness) in verbal learning and memory studies, whereas those who had acquired the two languages successively and in different contexts showed a greater functional separation in lexical organization and retrieval (Lambert & Rawlings, 1969). In addition, a number of behavioral studies pointed to a cognitive advantage in mental flexibility and metalinguistic awareness in bilinguals versus monolinguals (see Ben-Zeev, 1977; Peal & Lambert, 1962). A bilingual advantage in adults has also been reported in executive control tasks, and has in turn been attributed to bilinguals' experience in switching between languages (see Bialystok, 2004, for a review).

Psycholinguistic research on bilingualism has addressed bilinguals' ability to keep their two languages functionally distinct (as when interacting with monolingual speakers) while being able to move seemingly effortlessly between their two languages, as when interacting with other

bilingual speakers (Lambert, 1969). This issue continues to frame current psycholinguistic inquiry on the functional architecture of the bilinguals' two linguistic systems (see Dijkstra, 2003) and has spurred investigation into the neural bases of bilingual language functioning in brain-intact individuals. We turn now to the different research approaches that have been taken to study the bilingual brain.

Sources of Evidence

Aphasia

An important source of evidence about the bilingual brain comes from studies of aphasia, or language disturbances following unilateral brain injury. In several cases, nonparallel impairment and/or recovery patterns were reported. However, since many of the early reports were selected cases, and since those are more likely to be published if they present an unusual, and thereby interesting, case, estimates of the incidence of parallel versus nonparallel impairment are not likely to be that reliable. There are far fewer studies involving unselected cases. One such group study of 20 cases found that parallel language impairment and/or recovery represented 65% of the cases (Fabbro, 2001).

Still, when nonparallel recovery occurs, it is important to understand what factors might influence which language is more impaired. At least four different principles have been proposed. One makes reference to a general notion that skills learned early in life are the most resistant to loss following brain damage, perhaps because they are highly practiced. Applied to the domain of language, this view would predict that the patient's first learned language (or mother tongue) would be selectively spared and/or the first to recover in polyglot aphasia. This view has been described in terms of the rule of Ribot. An alternative view, described as Pitres' rule, proposed that what mattered was not when a language was learned, but how well it was used. According to Pitres' rule, the language that was used the most prior to the injury should be the most resistant to impairment following aphasia. A third principle, proposed by Minkowski (1963), noted that the emotional significance of the language for the patient was relevant in determining whether that language would be spared. Finally, it has been suggested that one may get a different pattern of impairment depending on the mode of acquisition or use of the language (primarily spoken vs. primarily written) and whether the auditory or the visual cortex suffered more damage (Luria, 1960).

What may one discern from the polyglot aphasia literature? One value of this literature is that it documents the variety and complexity of deficits that may arise in each of a patient's languages following brain injury. However, the sheer diversity of findings makes it difficult to draw conclusions. Conclusions are also difficult to arrive at given that information about a person's linguistic competence prior to the injury is not likely to be objective or complete, since it is typically obtained after the injury through family members, etc. Without having a reliable account of the patient's language proficiency prior to the aphasia, it is difficult to make sense of their language profile after the injury. A further limitation in interpreting aphasia evidence is that patients are rarely systematically assessed in all their languages. If they are formally assessed, the language assessment typically does not cover all aspects of language competence (e.g., semantic, syntactic, pragmatic). This situation is likely to improve as standardized aphasia test batteries (e.g., the Bilingual Aphasia Test, by Paradis, 1987) are used more often.

At present there is no clear consensus about how to interpret the polyglot aphasia evidence. One interpretation of selective loss or recovery in polyglot aphasia is what may be termed the

representational account; in this view, what is disrupted by brain injury are actual neural regions specialized for each language. These regions may be localized in same or different areas of the left cerebral hemisphere, or may involve right hemisphere areas as well. In this regard, it has been claimed that there is a higher incidence of crossed aphasia in bilinguals than in monolinguals, crossed aphasia being defined as aphasia following damage to the right hemisphere. However, the evidence on this issue is by no means clearcut (see Karanth & Rangamani, 1988; Vaid, 2002, for further discussion). A different interpretation of selective loss or recovery in aphasia is the functional account. In this account what is damaged in polyglot aphasia is not regions that house the languages of the patient but control mechanisms that govern access to a particular language (Green, 1998). In its present form, the evidence is compatible with either view, although the functional view provides a more parsimonious account.

Electro-Cortical Stimulation Mapping

Another source of evidence on brain organization of language in bilinguals comes from studies of bilingual epileptics undergoing a procedure known as electro-cortical stimulation mapping. In this procedure, electrodes are placed directly on the exposed cortex at different locations or sites. The effect of electrical stimulation is to temporarily render the person aphasic. That is, patients show speech arrests, hesitations, semantic errors, or have word finding difficulty. By determining which cortical sites led to temporary speech impairment, it is possible to map out the language-relevant areas of the brain in individual patients. This procedure is undertaken prior to surgery to remove areas of the brain to reduce the frequency or epileptic seizures in these patients; knowing which regions are language-relevant provides useful practical information in that the surgeon can avoid removing tissue close to those regions. Some 350 patients have been tested using this method, of which a small proportion have been bilingual. The use of bilinguals introduces additional complexity since the location of cortical sites and the nature of the response to the tasks used (typically, object naming or reading aloud) must be assessed for each of the bilingual's languages.

The first cortical stimulation studies to test bilinguals in both their languages were conducted by Ojemann and Whitaker (1978) on two patients and by Rapport, Tan, and Whitaker (1983), on a small number of patients. These studies documented what the authors termed partially distinct and partially overlapping cortical representations of the bilinguals' languages. That is, electrical stimulation of certain cortical regions selectively disrupted naming in only one of the languages, whereas stimulation of other regions disrupted naming in both languages. However, the particular regions in which selective disruption of naming were found differed across individuals. It was also noted that language-relevant cortical regions were more widely dispersed in the less proficient language compared to the more proficient one (Rapport et al., 1983).

Three recent studies have been published using cortical mapping in bilingual patients. Roux and Tremoulet (2002) studied 12 right-handed French-speaking bilingual patients of differing language backgrounds on counting, word naming, and reading in each language. Among the 4 patients in the sample who were early bilinguals, defined as the L2 acquired before the age of seven years, 3 showed naming or word finding difficulty in only one language in response to stimulation of certain cortical sites. Of the 6 nonproficient bilingual patients tested, only 1 showed a wider dispersal of cortical sites disrupting naming in the less proficient language. In 5 of the 12 patients an overlapping set of sites across languages was found whereas in the remaining 7 patients areas were found that were either language specific, in frontal and in temporal-parietal areas of the brain.

A study by Roux et al. (2004) compared intraoperative mapping of cortical areas involved in picture naming and reading sentences aloud in a group of 19 bilingual or multilingual and 35 monolingual (French) patients. The bilinguals were subdivided into four groups on the basis of age and proficiency of L2. The results showed no significant difference between bilingual and monolingual groups in reading or naming site locations, nor was there a statistical difference between first and second language cortical sites. Eight of the 19 bilinguals showed at least one language-specific reading site.

Lucas, McKhann, and Ojemann (2004) reported data from 22 bilingual patients and 117 monolingual control patients on a cortical stimulation study of object-naming to address whether multiple languages are functionally separated in the bilingual brain and whether language organization in bilinguals resembles that in monolinguals. Evidence was obtained for distinct cortical modules for different languages in 21 of the 22 bilinguals; that is, sites were found in which stimulation reliably produced naming deficits in only one of the languages. Furthermore, in 43% of the bilinguals, stimulation at one site selectively produced errors in L1, whereas stimulation at another site produced errors only in L2. Additionally, it was found that the overall extent of language-sensitive cortical sites did not differ across the two languages nor did it differ as a function of language proficiency. However, the sites associated with L1 versus L2 naming disruption did appear to differ in anatomical distribution, with posterior temporal and parietal regions being more associated with L2-specific sites whereas anterior regions tended to show shared sites. An analysis of L1 sites in the bilinguals versus monolinguals suggested that primary language representation in the two groups was virtually the same. However, an analysis of L2 sites in bilinguals compared with monolingual (L1) sites showed differences in 7 of the 28 zones, particularly around classic receptive language areas, with an underrepresentation of sites in bilinguals than in monolinguals.

In sum, the cortical stimulation data illustrate considerable variability in anatomical distribution of language-relevant cortical sites on object naming, counting and reading tasks performed in L1 versus L2 of late bilinguals, and between bilinguals on their L2 and monolinguals. These data argue for mapping to be undertaken separately in each language of the patients to localize language-sensitive sites prior to surgery. The findings suggest that L1 and L2 representation may differ. However, no consistent support was found for an association between language proficiency and extent of cortical activation.

As a tool for understanding brain organization of language, cortical stimulation studies have certain limitations. One is that the cortical area examined using electrocortical stimulation is restricted to the area of the craniotomy (i.e., surgical incision of the skull), thus regions that extend beyond the craniotomy are not accessible. Another limitation is that direct stimulation mainly maps the gyral surface, unlike other forms of brain mapping, such as PET or fMRI, which allow examination of activation at the level of the sulci, or fissures. Finally, in view of the fact that cortical stimulation data are based on patients in whom a long history of seizures may have resulted in some neural reorganization, generalizations to the healthy brain must be made with caution (but see Simos et al., 2001, who found a similar pattern of variability in language-receptive regions even in healthy bilinguals).

The clinical data are of value, but to fully understand language organization in the normal brain it is important to test non-brain-damaged individuals. We turn now to a consideration of sources of evidence based on the healthy brain.

Behavioral Laterality Measures

The most extensive body of research on language and the brain in healthy bilinguals involves laterality studies. These studies exploit the contralateral sensory organization of the brain by presenting linguistic input in the left or the right visual field or the left or right ear, and inferring from the pattern of response the relative degree of involvement of the left or right hemisphere in the processing of the input. In monolinguals, a right ear advantage (REA) or right visual field advantage are typically observed for verbal stimuli. That is, verbal judgments are made faster when the stimuli are initially directed to the left hemisphere (LH). Do bilinguals show the same pattern, or is there greater involvement of the right hemisphere (RH) in bilinguals' use of language (Obler, 1981; Schneiderman, 1986)?

Laterality studies with bilinguals were particularly prominent in the 1970s and 1980s, and concerns about methodological issues in conducting laterality research also appeared with bilingual studies (see Obler, Zatorre, Galloway, & Vaid, 1982). In 1980, Vaid and Genesee proposed an integrative model of bilingual lateralization in which language acquisitional factors were hypothesized to influence the strategies deployed to process language and thus the relative involvement of the two hemispheres. They proposed that hemispheric involvement in bilinguals would resemble that of monolinguals to the extent that the two languages of bilinguals were acquired simultaneously and in similar contexts; however, RH involvement in bilinguals was expected to be more likely the later the L2 was acquired, the more informal the exposure to the L2, and the earlier the stage of L2 acquisition. In other words, language lateralization patterns were hypothesized to differ in early versus late bilinguals (where early bilinguals are generally defined as those who mastered their two languages before the age of 6 years, and late bilinguals are defined as those who mastered their second language after the age of 12 years).

To test these hypotheses, Vaid and Hall (1991) undertook a meta-analysis of 59 published and unpublished laterality studies of bilinguals. A meta-analysis is a quantitative review of a body of literature, in which data from individual studies are combined and then analyzed to determine patterns of lateralization, or relative reliance on the left hemisphere in processing language. In Vaid and Hall (1991), no differences between bilinguals and monolinguals in lateralization were found in the 11 studies that had included monolingual groups. However, among bilinguals, the variable of age of L2 acquisition was significant: early bilinguals were found to be less left lateralized than late bilinguals (Vaid & Hall, 1991). Subsequently, another bilingual/monolingual meta-analytic investigation, this one based on 28 studies that compared bilinguals with monolinguals, found that bilinguals were less left lateralized than monolinguals; this was particularly true of early bilinguals (Hull & Vaid, 2005). A subsequent meta-analysis, based on 69 studies that compared bilinguals on their two languages or with other bilinguals, corroborated the finding of age of onset of bilingualism effects in lateralization. That is, early bilinguals showed evidence of bilateral hemispheric involvement in language processing, whereas late bilinguals showed greater left lateralization. No differences in lateralization were found between the L1 and L2 of bilinguals (Hull & Vaid, 2007).

The finding that early bilinguals make use of both hemispheres in processing language raises the question as to why simultaneous acquisition of two languages appears to alter the relative use of the two hemispheres as compared to acquisition of a single language or acquisition of a second language later in life. Some previous cognitive studies of bilingual adults that have compared early versus late bilinguals on various linguistic and other tasks (see e.g., Lambert, 1969; Vaid, 1984) have suggested that early bilinguals appear to be more inclined to process for meaning, whereas late bilinguals show a preference for processing the form of utterances. Other studies comparing early

versus late learners of a second language have argued that early exposure to a language is critical in achieving grammatical competence (Newport et al., 2001; Wartenburger et al., 2003). However, questions remain as to the nature of the interpretation of the observed laterality differences between early bilinguals and monolinguals, and between early bilinguals and late bilinguals. Given that the majority of studies with adult bilinguals have used late bilinguals, there is clearly a need for more cognitive and neurocognitive research on early bilinguals.

The meta-analysis findings are instructive in showing that the critical difference in brain lateralization of language may involve differences between groups rather than between languages. The findings also point to the importance of including monolingual participants in any study that seeks to address whether bilinguality differentially affects cerebral representation of language. Despite the large number of bilingual laterality studies that have appeared, not all groups or tasks have been studied to the same extent. More studies of non-English-speaking bilingual participants are needed, as are more studies of early bilinguals. Further, given that the majority of laterality studies have used single words as stimuli, more studies are needed that examine language processing at the sentence level or beyond (see Heredia & Altarriba, 2002), and that separate out different components of language for study (e.g., phonetic, semantic, syntactic, and pragmatic aspects).

Given that laterality research, by definition, only allows study of interhemispheric differences, it does not speak to the issue of whether bilinguals show different patterns of neural activation within each hemisphere. To address this issue, we turn to neurobehavioral techniques.

Neurobehavioral Measures

Techniques that permit examination of neural activity within each hemisphere as well as between the two hemispheres include (a) electroencephalographic measures, such as EEG, and event-related brain potentials (ERP), and magnetocephalographic measures, also known as magnetic source imaging, (b) hemodynamic imaging, such as positron emission tomography (PET), functional magnetic resonance imaging (fMRI), and near infrared spectrometry (NIRS), and (c) transcranial magnetic stimulation.

In electroencephalographic research, brain wave components reflecting the summed activity of several neurons are elicited by specific sensory, motor, or cognitive events. Differences in the amplitude and latency of event-related potential (ERP) components allow researchers to infer the degree and timing of electrical activity in the brain during a specific cognitive activity. For example, one commonly studied ERP component is known as the N400; it is found when there is some unexpected semantic event, and is elicited by presenting sentences with anamolous endings. ERP research allows fine-grained analysis of the temporal unfolding of events at the millisecond level on up. As such, ERP studies provide an ideal, real time measure to study linguistic processing.

Electrophysiological measures are being increasingly used with bilingual populations and over three dozen such studies have by now appeared (see Hull & Vaid, 2005, for a comparison of ERP and laterality studies). Recent electrophysiological research suggests the importance of early language experience in influencing how neural subsystems underlying language will develop and function.

Based as they are on measures of blood flow changes in brain regions, PET and fMRI methods provide an indirect measure of neural activity as compared to electrophysiological or magnetic source imaging measures. Furthermore, unlike cortical stimulation or lesion-deficit studies that indicate areas that are essential for a particular task, functional imaging studies using hemodynamic procedures point to areas that are involved in some way with a particular function, without

being able to characterize with certainty the particular regions that are necessary for performing that function.

Research using functional neuroimaging techniques to study language representation in bilinguals has grown exponentially over the past decade. At present there are nearly three dozen fMRI studies, over a dozen PET studies (see Vaid & Hull, 2002), and one NIRS study (Quaresima, Ferrari, van der Sluijs, Menssen, & Colier, 2002). We will focus on findings from the hemodynamic measures in the remainder of this chapter, highlighting relevant methodological and interpretive issues.

Hemodynamic Neuroimaging Studies

Hemodynamic imaging studies are based on the following rationale: the performance of any task places demands on the brain; these demands are met through changes in neural activity in various areas; changes in neuronal activity in turn produce changes in local cerebral blood flow, which are measured directly by PET and indirectly with fMRI or NIRS. PET studies use radioactive tracers to image blood flow or metabolism. Areas that have a higher blood flow will have a larger amount of tracer and will thus emit a stronger signal. Functional magnetic resonance imaging measures changes in the relative amounts of oxygenated versus deoxygenated hemoglobin present in neural regions that are metabolically active during a task. Since it does not require the use of radionuclides, a participant in an fMRI study can undergo many more trials than would be feasible in a PET study. Furthermore, fMRI offers better temporal and spatial resolution than PET. Near infra red spectroscopy (NIRS) is a relatively new and promising hemodynamic imaging technique that measures regional changes in the concentration of oxygenated and deoxygenated blood (reflecting changes in oxygen supply and oxygen consumption) in small vessels of brain cortex. It has a high temporal resolution and a high signal-to-noise ratio, permitting observation of oxygenation changes at the single trial level. It is more compact, portable, and affordable than fMRI, and there is no scanner noise problem affecting attention as there is in fMRI studies.

The typical paradigm in hemodynamic studies involves participants performing a cognitive task for some period of time and contrasting neural activity during that task period with activity during a baseline task. It is assumed that brain activity will change between the two tasks and will reflect task demands. Brain areas that show increases in activation are identified by noting which specific brain regions change their signal intensity as the task state changes from the baseline condition to the target task.

An important issue in hemodynamic imaging studies is how to identify areas where a significant change of activity has occurred. Different statistical analyses have been developed to address this issue. One of these restricts the regions to be surveyed based on *a priori* considerations of which areas are thought to be more relevant to the function in question. This is the region of interest (R01) approach. In the case of language research, using this approach would mean looking only at the so-called classical language areas. Another approach is to survey images without *a priori* assumptions about the locations of significant changes. However, use of this approach presents more difficult statistical problems given the large number of spatial locations that are not statistically independent from one another and in which there are small numbers of observations. To avoid the possibility of falsely deciding that a region shows an increase in activation, the use of strict statistical cutoffs is routine in this approach.

Language imaging research with monolinguals has found that most regions showing activation changes involve the so-called classical language areas, established by lesion evidence (i.e.,

areas surrounding the Sylvian fissure in the left hemisphere). In addition, language-related activation has been observed in other areas in the left hemisphere and in certain right hemisphere regions. In short, the set of regions activated in functional imaging studies of language is larger and more variable than those typically observed from lesion deficit data.

What needs to be kept in mind, though, is that assignment of regions to functions based on activation data alone is not definitive since some regions may be activated because they are critical for task performance, while activation of other regions may reflect task-irrelevant, ancillary mental activity. An additional variable constraining interpretation is that the activation changes noted on specific tasks will vary depending on the choice of the baseline task. Thus, the assignment of regions to linguistic functions is usually tentative.

With the previous information as context, we can now consider the emerging literature on functional neuroimaging of language in multiple language users. The predominant question examined in these studies has been whether the regions activated for a second language spatially overlap with those activated for the first language and whether the degree of overlap is influenced by factors such as proficiency or age of second language acquisition. A related question has been whether the amount of neural activation varies across languages, also as a function of language proficiency and/or age of onset of bilingualism.

There is no clear consensus on either of these questions. Some studies show evidence of overlapping activation across the two languages of bilinguals in late bilinguals (Illes et al., 1999) or in early and late bilinguals (Frenck-Mestre, Anton, Roth, Vaid, & Viallet, 2005) whereas others show evidence of distinct regions (Dehaene et al., 1997; Kim, Relkin, Lee, & Hirsch, 1997; Perani et al., 1996; Rickard Liow & Tham, 2004). In terms of the relative number of studies of each type, there are far more studies showing overlapping activation profiles than those showing distinct language activation. Consideration of proficiency or age of onset of bilingualism has not clarified the picture, with some studies claiming a difference in L1 versus L2 activation in late but not in early bilinguals (Kim et al., 1997) and other studies reporting an identical pattern of activation for the two languages in early and late bilinguals alike (Frenck-Mestre et al., 2005). With respect to extent of activation, some evidence suggests that less proficiency is associated with the recruitment of more regions (Hasegawa, Carpenter, & Just, 2002) but there is no general consensus on this issue.

Although it is assumed that the presence or absence of spatially overlapping regions of activation means that the languages are represented in common or separate regions, one need not make this inference. Rather than reflecting differential neural representation of the languages, differences in activation found across languages may reflect other factors such as the fact that performing a task in one's second language may be more cognitively demanding and thus may require more resources (see Hasegawa et al., 2002). Alternatively, it may reflect the usual variability observed across imaging runs even in a single language when subjects are tested in more than one session (Mahendra, Plante, Magliore, Milman, & Trouard, 2003).

Interpretive difficulties are compounded when studies employ tasks that do not require overt responses (i.e., where participants are instructed simply to think about the response, without saying it out loud). Indeed, several hemodynamic studies with bilinguals have employed covert word-generation tasks. The reason that covert tasks are used is to minimize movement artifacts produced by articulation; however, there is evidence to suggest that different brain regions are activated in overt versus covert versions of a given task. Furthermore, when using covert generation in the absence of any behavioral validation, as was the case in the Kim et al. (1997) study, where participants were to think about what they had eaten the day before for lunch or dinner, in one language or another, it becomes impossible to know the extent to which participants were actually carrying out the

task as instructed. Additionally, the use of spatial smoothing or averaging techniques, a standard practice in functional imaging studies, may have the unintended effect of removing individual differences in neural activation. Finally, there is always the possibility that the presence of overlapping activation across languages is due to the lack of sufficiently fine-grained spatial resolution. That is, what appears as a lack of difference across languages in the specific neural regions activated may turn out to be misleading, if the measures are not sensitive enough to reveal differences in activation that may actually be present but may go undetected at the level of spatial resolution of the imaging techniques in use. This particular problem is likely to become less of an issue with the development of more sensitive imaging techniques with higher spatial resolution.

Toward Convergence

Although most bilingual neuroimaging research has focused on differences in spatial activation within the language-dominant hemisphere, it would be instructive to consider what these studies have found with respect to the issue of interhemispheric activation. Only a handful of functional imaging studies have actually reported activation patterns across hemispheres. An fMRI study by Illes et al. (1999) compared fluent English-Spanish and Spanish-English bilinguals who had acquired their second language at around 12 years of age and found spatially overlapping frontal lobe activation patterns on a same/different synonym judgment task. Further analysis indicated that left frontal activation was greater than right frontal activation for both languages of the late bilinguals and particularly so for the L2 relative to the L1 (the latter trend was not significant, though). Dehaene et al. (1997) reported an fMRI study with moderately fluent French-English bilinguals who had acquired their second language during late childhood and showed increased RH participation during L2 (relative to L1) processing on a story listening task. Significant activation differences were found between the two languages. Chee, Tan, and Thiel (1999) reported an fMRI study using a word stem completion task with fluent Chinese-English late bilinguals. Interestingly, comparisons of laterality effect sizes for frontal lobe activation patterns of early and late bilinguals in this study showed a nonsignificant trend for increased RH participation on both languages of early bilinguals relative to participants with late L2 acquisition.

As we have already seen, meta-analytic results based on behavioral laterality studies with bilinguals point to less left lateralization in early bilinguals than in late bilinguals or monolinguals. However, since imaging studies have almost exclusively included comparisons across languages, they leave open the question of possible group differences. Indeed, only two bilingual imaging studies have included monolingual comparison groups and only a few have compared different bilingual subgroups, such as early versus late bilinguals (Frenck-Mestre et al., 2005; Mahendra et al., 2003; Wartenburger et al., 2003). To resolve differences in findings across imaging studies, there need to be replications of studies that systematically compare performance across groups on each language. The sample of subjects used in imaging studies needs to be increased as well to permit direct statistical comparisons across subgroups varying in proficiency or L2 acquisition age.

A majority of existing imaging studies seeking to make claims about the effect of a particular variable (e.g., age, or proficiency) have not been designed to permit an actual test of the claims. An ideal test would require a comparison across groups selected to vary on a particular dimension and only on that dimension. From the laterality findings we see the importance of including relevant comparisons between early and late proficient versus nonproficient bilinguals, as also between bilinguals and monolinguals. Also, considering neural activation underlying different components

of language is a more promising way to approach future work rather than looking at the whole of language in a global sense.

Summary and Conclusion

Our understanding about the bilingual brain has been shaped not only by the possibilities and limitations of available techniques to study language and the brain but also by the ways in which language, neurofunctional organization of language, and bilingualism itself have been conceptualized (see Vaid, 2002). Advances in our understanding of the bilingual brain will require the joint use of multiple, converging measures, behavioral and neurobehavioral, and multiple comparison groups (e.g., bilingual vs. monolingual, early vs. late bilingual, late proficient vs. nonproficient bilinguals, and users of linguistically similar vs. dissimilar language pairs). In addition, it will require an ongoing engagement with conceptual developments in bilingualism, language, and neurocognitive functioning.

Future work on the bilingual brain should consider three relatively understudied issues. The first concerns neural correlates of code-switching. Most bilinguals engage in code-switching when speaking with other bilinguals, yet there is very little psycholinguistic and neurocognitive research on this important component of bilinguals' linguistic repertoire (see Heredia & Altarriba, 2001; Moreno, Federmeier, & Kutas, 2002). A greater consideration of code-switching would also serve to lessen the emphasis on treating the languages of bilinguals as autonomous entities, and direct more emphasis on the dynamic and interactive aspects of bilingual language use (Grosjean, 1989).

A second area in which more research may prove fruitful is to consider neural correlates of the bilingual cognitive advantage. If bilingualism in fact confers greater cognitive flexibility, metalinguistic awareness (see Simonton this volume), and ability to inhibit irrelevant information, perhaps one should be looking at frontal lobe function in relation to bilingualism (see Bialystok, 2001). Furthermore, one should not restrict the scope of research to linguistic tasks but consider how bilingualism may influence processing in nonlinguistic tasks, given that cognitive repercussions of bilingualism are thought to extend beyond the linguistic domain (see Hausmann, Durmusoglu, Yazgan, & Güntürkün, 2004, for evidence for reduced laterality in bilinguals on a nonverbal task).

A third area of inquiry is to consider structural correlates of bilingualism. Some imaging studies have begun to demonstrate alterations in neural functioning associated with the learning of new sounds (Golestani & Zatorre, 2003). If acquiring a second language indeed alters brain functioning, it would be plausible to expect differences between bilinguals and monolinguals at the level of brain structure as well. Indeed, a recent study suggests that there may well be structural differences associated with acquisition of another language (Mechelli et al., 2004). This study compared English-speaking monolinguals with early bilingual and late bilingual speakers of English and a second European language. Significantly greater grey matter density in the left inferior parietal cortex was found in bilinguals as compared to monolinguals (Mechelli et al., 2004). Furthermore, in a sample of Italian speakers who had learned English as a second language at varying ages, with age of L2 acquisition correlating negatively with overall L2 proficiency, the density of grey matter in the left inferior parietal cortex was found to increase with second language proficiency and decrease with later age of acquisition. Whether the increase in grey matter density observed in bilinguals is due to changes in neuronal size, or dendritic or axonal arborization could not be determined by the method used. Nevertheless, the results are clearly provocative

in their implication that "the structure of the human brain is altered by the experience of acquiring a second language" (Mechelli et al., 2004, p. 757). What is particularly noteworthy is that the difference in brain density was most pronounced in early bilinguals, who showed greater grey matter density in both the left and the right hemisphere, a result that converges nicely with the findings from the laterality literature showing greater bilateral hemispheric involvement in language processing in early bilinguals as compared to monolinguals.

What have we learned from the study of the bilingual brain? It would appear that early cognitive and clinical approaches to the study of bilinguals anticipated what was later confirmed in experimental studies involving behavioral and neurobehavioral measures with brain-intact bilinguals, namely, that bilingualism, and in particular, early onset of bilingualism, alters neural functioning. Specifically, the evidence to date, taken together, suggests that the neural repercussions of early bilingualism involve a reduced dependence on the left hemisphere for language processing and a greater bilateral hemispheric involvement than that characterizing single language users or late second language learners.

List of Key Words and Concepts

Aphasia, Bilingual Aphasia Test, Brain lateralization, Contralateral, Early bilinguals, Electroencephalographic (EEG), Electro-cortical stimulation mapping, Event-related brain potentials (ERPs), Functional magnetic resonance imaging (fMRI), Hemodynamic imaging, Integrative model of bilingual lateralization, Late bilinguals, Laterality studies, Left hemisphere (LH), Magnetocephalographic measures, Meta-analysis, Near infrared spectrometry (NIRS), Neurobehavioral measures, N400, PET, Pitres' Rule, polyglot, Positron emission tomography (PET), Representational account, Right ear advantage (REA), Right hemisphere (RH), Rule of Ribot, RO1, Selective loss, Sylvian fissure, Transcranial magnetic stimulation

Internet Sites Related to the Bilingual Brain

Bilingual Brain: http://www.arches.uga.edu/~smiling/index.htm
Books on Bilingualism and the Brain: http://www.sinc.sunysb.edu/Class/lin541/Books1.html
Second Language Learning: http://faculty.washington.edu/chudler/second.html
The Bilingual Brain: http://www.richmond.edu/~pli/projects/project4/bilbrain.html

Discussion Questions

1. What is a meta-analysis, and why is it useful?
2. What can we conclude about the bilingual brain?
3. Is the bilingual's second language housed in the right hemisphere? Is the first language housed in the left hemisphere? Discuss the various aspects of lateralization mentioned in the chapter with regards to first and second language representation.
4. Please list some of the methods used to investigate the bilingual brain.

5. What are some of the major research issues or debates that are currently being discussed in the literature on the bilingual brain?

Suggested Research Projects

1. For this next project, go to a psychological database (e.g., *PsychINFO or EBSCO*), and obtain Furtado and Webster's (1991) article cited in the *Suggested Readings*, and find out how these researchers measured *language lateralization*. Can you describe the technique used in their experiment?
2. For this project, go to a psychological database and find at least three research articles on the *critical period hypothesis* and report your findings to your class. How is the critical period hypothesis related to bilingualism or second language? Did you find support for the critical period hypothesis?
3. Do you think there is a relationship between the critical period hypothesis and the bilingual brain?

Suggested Readings

Furtado, J. C., & Webster, W. G. (1991). Concurrent language and motor performance in bilinguals: A test of the age of acquisition hypothesis. *Canadian Journal of Psychology, 45,* 448–461.

Obler, L., Zatorre, R., Galloway, L., & Vaid, J. (1982). Cerebral lateralization in bilinguals: Methodological issues. *Brain and Language, 15,* 40–54.

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References

Albert, M., & Obler, L. K. (1978). *The bilingual brain*. New York: Academic Press.

Ben-Zeev, S. (1977). The influence of bilingualism on cognitive strategy and cognitive development. *Child Development, 48,* 1009–1018.

Bialystok, E. (2001). *Bilingualism in development: Language, literacy, and cognition.* Cambridge, UK: Cambridge University Press.

Bialystok, E. (2004). The impact of bilingualism on language and literacy development. In T. K. Bhatia & W. C. Ritchie (Eds.), *Handbook of bilingualism* (pp. 577–602). Malden, MA: Blackwell.

Chee, M., Tan, E., & Thiel, T. (1999). Mandarin and English single word processing studied with –3056.

Coggins, P., Kennedy, T., & Armstrong, T. (2004). Bilingual corpus callosum variability. *Brain and Language, 89,* 69–75.

Dehaene, S., Dupoux, E., Mehler, J., Cohen, L., Paulesu, E., Perani, D., van de Moortel, P., Lehericy, S., & Le Bihan, D. (1997). Anatomical variability in the cortical representation of first and second language. *Neuroreport, 8,* 3809–3815.

Dijkstra, T. (2003). Lexical storage and retrieval in bilinguals. In R. van Hout, A., Hulk, F. Kuiken, & R. Towell (Eds.), *The interface between syntax and the lexicon in second language acquisition* (pp. 129–150). Amsterdam: John Benjamins.

Fabbro, F. (2001). The bilingual brain: Bilingual aphasia. *Brain and Language, 79,* 201–210.

Frenck-Mestre, C., Anton, J. L., Roth, M., Vaid, J., & Viallet, F. (2005). Articulation in early and late bilinguals' two languages: Evidence from functional magnetic resonance imaging. *Neuroreport, 16,* 761–765.

Golestani, N., & Zatorre, R. (2003). Learning new sounds of speech: Reallocation of neural substrates. *NeuroImage, 21,* 494–506.

Green, D. (1998). Mental control of the bilingual lexico-semantic system. *Bilingualism: Language and Cognition, 1,* 67–81.

Grosjean, F. (1989). Neurolinguists beware! The bilingual is not two monolinguals in one person. *Brain and Language, 36,* 3–15.

Hasegawa, M., Carpenter, P., & Just, M. (2002). An fMRI study of bilingual sentence comprehension and workload, *Neuroimage, 15*(3), 647–660.

Hausmann, M., Durmusoglu, G., Yazgan, Y., & Güntürkün, O. (2004). Evidence for reduced hemispheric asymmetries in non-verbal functions in bilinguals. *Journal of Neurolinguistics, 17,* 285–299.

Heredia, R., & Altarriba, J. (2001). Bilingual language mixing: Why do bilinguals code switch? *Current Trends in Psychological Science, 10,* 164–168.

Heredia, R., & Altarriba, J. (Eds.). (2002). *Bilingual sentence processing.* Amsterdam: Elsevier.

Holtzheimer, P., Fawaz, W., Wilson, C., & Avery, D. (2005). Repetitive transcranial magnetic stimulation may induce language switching in bilingual patients. *Brain and Language, 94,* 274–277.

Hull, R., & Vaid, J. (2005). Clearing the cobwebs from the study of the bilingual brain: Converging evidence from laterality and ERP studies. In J. Kroll & A. M. de Groot (Eds.), *Handbook of bilingualism: Psycholinguistic approaches* (pp. 480–496). Oxford: Oxford University Press.

Hull, R., & Vaid, J. (2007). Bilingual language lateralization: A meta-analytic tale of two hemispheres. *Neuropsychologia, 45*(2), 1987–2008.

Ijalba, E., Obler, L. K., & Chengappa, S. (2004). Bilingual aphasia. In T. K. Bhatia & W. C. Ritchie (Eds.), *The handbook of bilingualism* (pp. 71–89). Malden, MA: Blackwell.

Illes, J., Francis, W., Desmond, J., Gabrieli, J., Glover, G., Poldrack, R., Lee, C., & Wagner, A. (1999). Convergent cortical representation of semantic processing in bilinguals. *Brain and Language, 70*(3), 347–363.

Karanth, P., & Rangamani, G. N. (1988). Crossed aphasia in multilinguals. *Brain and Language, 34,* 169–180.

Kim, K., Relkin, N., Lee, K., & Hirsch, J. (1997). Distinct cortical areas associated with native and second languages. *Nature, 388*, 171–174.

Lambert, W. E. (1969). Psychological studies of interdependencies of the bilingual's two languages. In J. Puhvel (Ed.), *Substance and structure of language* (pp. 99–126). Los Angeles: University of California Press.

Lambert, W. E., & Fillenbaum, S. (1959). A pilot study of aphasia among bilinguals. *Canadian Journal of Psychology, 13,* 28–34.

Lambert, W. E., & Rawlings, C. (1969). Bilingual processing of mixed language associative networks. *Journal of Verbal Learning and Verbal Behavior, 6,* 604–609.

Lucas, T. H., McKhann, G. M., & Ojemann, G. A. (2004). Functional separation of languages in the bilingual brain: A comparison of electrical stimulation language mapping in 25 bilingual patients and 117 monolingual control patients. *Journal of Neurosurgery, 101,* 449–457.

Luria, A. (1960). Differences between the disturbances of speech and writing in Russian and in French. *International Journal of Slavic Linguistics and Poetics, 3,* 13–22.

Mahendra, N., Plante, E., Magloire, J., Milman, L., Trouard, T. P. (2003). fMRI variability and the localization of languages in the bilingual brain. *Neuroreport, 14*(9), 1225–1228.

Mechelli, A., Crinion, J., Noppeney, U., O'Doherty, J., Asburner, J., Frackowiak, R., & Price, C. (2004). Structural plasticity in the bilingual brain. *Nature, 431,* 757.

Minkowski, M. (1963). On aphasia in polyglots. In L. Halpern (Ed.), *Problems of dynamic neurology*. Jerusalem: Hebrew University.

Moreno, E., Federmeier, K., & Kutas, M. (2002). Switching languages, switching palabras (words): An electrophysiological study of code switching, *Brain and Language, 80,* 188–207.

Neville, H., & Bavelier, D. (2002). Human brain plasticity: Evidence from sensory deprivation and altered language experience. In M. Hofman, G. Boer, A. Holtmaat, E. Van Someren, J. Verhaagen, & D. Swaab (Eds.), *Progress in brain research* (pp. 177–188). Elsevier Science.

Newport, E., Bavelier, D., & Neville, H. (2001). Critical thinking about critical periods: Perspectives on a critical period for language acquisition. In E. Dupoux (Ed.), *Language, brain, and cognitive development: Essays in honor of Jacques Mehler* (pp. 481–502). Cambridge: M.I.T. Press.

Obler, L. K. (1981). Right hemisphere participation in second language acquisition. IN K. C. Diller (ed.). *Individual differences and universals in language learning aptitude* (pp. 53–64). Rowley, MA: Newbury House.

Obler, L., Zatorre, R., Galloway, L., & Vaid, J. (1982). Cerebral lateralization in bilinguals: Methodological issues. *Brain and Language, 15,* 40–54.

Ojemann, G. A., & Whitaker, H. A. (1978). The bilingual brain. *Archives of Neurology, 35,* 409–412.

Paradis, M. (1983). *Readings on aphasia in bilinguals and polyglots*. Montreal: Didier.

Paradis, M. (1987). *The assessment of bilingual aphasia.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Paradis, M. (2001). Bilingual and polyglot aphasia. In R. Berndt (Ed.), *Handbook of neuropsychology,* (Vol. 3; pp. 69–91). Amsterdam: Elsevier.

Paradis, M. (2004). *An integrated neurolinguistic theory of bilingualism*. John Benjamins.

Perani, D., Dehaene, S., Grassi, F., Cohen, S., Cappa, S., Dupoux, Fazio, F., & Mehler, J. (1996). Brain processing of native and foreign languages. *NeuroReport, 7,* 2439–2444.

Peal, E., & Lambert, W. E. (1962). The relations of bilingualism to intelligence. *Psychology Monographs, 16, I,* Pt. 2.

Pitres, A. (1895). Études sur l'aphasie chez les polyglottes. *Revue de Médecine, 15,* 873–899.

Quaresima, V., Ferrari, M., van der Sluijs, M., Menssen, J., & Colier, W. (2002). Lateral frontal cortex oxygenation changes during translation and language switching revealed by non-invasive near-infrared multi-point measurements. *Brain Research Bulletin, 59*(3), 235–243.

Rapport, R. L., Tan, C. T., & Whitaker, H. A. (1983). Language function and dysfunction among Chinese- and English-speaking polyglots: Cortical stimulation, Wada testing, and clinical studies. *Brain and Language, 18,* 342–366.

Ribot (1881). *Diseases of memory: an essay in the positive psychology*. London: Paul.

Rickard L. S., & Tham, W. (2004). *Neural substrate differences in bilingual individuals for English and Chinese*. Unpublished manuscript, National University of Singapore.

Roux, F. E., Lubrano, V., Lauwers-Cances, V., Tremoulet, M., Mascott, C., & Demonet, J. F. (2004). Intra-operative mapping of cortical areas involved in reading in mono- and bilingual patients. *Brain, 127,* 1796–1810.

Roux, F. E., & Tremoulet, M. (2002). Organization of language areas in bilingual patients: A cortical stimulation study. *Journal of Neurosurgery, 97*(4), 857–864.

Schneiderman, E. (1986). Leaning to the right: Some thoughts on hemisphere involvement in language acquisition. In J. Vaid (Ed.), *Language processing in bilinguals: Psycholinguistic and neuropsychological perspectives* (pp. 233–251). Hillsdale, NJ: Lawrence Erlbaum Associates.

Simos, P., Castillo, E., Fletcher, J., Francis, D., Maestud, F., Breier J., Maggio, W., & Papanicolaou, A. (2001). Mapping of receptive language cortex in bilingual volunteers by using magnetic source imaging. *Journal of Neurosurgery, 95,* 76–81.

Vaid, J. (1984). Visual, phonetic, and semantic processing in early and late bilinguals. In M. Paradis & Y. Lebrun (Eds.), *Early bilingualism and child development* (pp. 175–191). Lisse: Swets & Zeitlinger.

Vaid, J. (2002). Bilingualism. In V. S. Ramachandran (Ed.), *Encyclopedia of the human brain* (Vol. 1; pp. 417–432). San Diego: Elsevier.

Vaid, J., & Genesee, F. (1980). Neuropsychological approaches to bilingualism: A critical review. *Canadian Journal of Psychology, 34,* 417–445.

Vaid, J., & Hall, D. G. (1991). Neuropsychological perspectives on bilingualism: Right, left, and center. In A. Reynolds (Ed.), *Bilingualism, multiculturalism and second language learning: The McGill conference in honour of Wallace E. Lambert* (pp. 81–112). Hillsdale, NJ: Lawrence Erlbaum Associates.

Vaid, J., & Hull, R. (2002). Re-envisioning the bilingual brain using functional neuroimaging: Methodological and interpretive issues. In F. Fabbro (Ed.), *Advances in the neurolinguistics of bilingualism* (pp. 315–355). Udine Forum: Udine University Press.

Wartenburger, I., Heekeren, H. R., Abutalebi, J., Cappa, S. F., Villringer A., & Perani, D. (2003). Early setting of grammatical processing in the bilingual brain. *Neuron, 37*(1*),* 159–170.

III

CREATIVITY AND DEVELOPMENTAL PRINCIPLES

Chapter 7

Bilingualism and Creativity

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Introduction

Creative behavior takes many forms. At one extreme, creativity can be manifested in the epochal achievements of historic geniuses, such as those that highlight the careers of Newton, Descartes, Shakespeare, Beethoven, and Michelangelo. This is sometimes referred to as *Big-C* creativity (Simonton, 2000). At the other extreme is the more everyday creativity that takes place at home and work. An instance of this case might be a new desert recipe or a novel way of getting donations for the annual office party. This type of creativity has been called *little-c* creativity (Simonton, 2000). Of course, a continuum connects these two extreme forms of the phenomenon. In the middle ground is creativity that has wide impact but falls short of historic significance. An example might be the creativity of an inventor who designs a *better mousetrap* that is successfully manufactured and marketed, and yet earns the creator more fortune than fame.

Linking these various forms of creativity is a common definition (Simonton, 2000). A person is said to be creative if he or she can generate ideas that fulfill two requirements. First, the idea must be *original*. For everyday forms of creativity, the idea must be original to the individual person, whereas for more momentous forms of creativity the idea must be original with respect to a whole discipline, nation, or civilization. Second, the idea must be *functional*, that is, it must be adaptive, or effective, or work according to appropriate criteria. A mousetrap that fails to catch mice cannot be considered functional, however original its design. This second requirement is

essential to rule out ideas that are not only novel but also fail to accomplish what they set out to do. The hallucinations and delusions of a paranoid psychotic can be highly novel and yet be strikingly bizarre and maladaptive.

The question to be addressed in this chapter is whether bilingualism is associated with creativity in whatever form it may take. If so, what is the basis for this association? I begin by giving an overview of relevant empirical research. Next I briefly examine some important methodological considerations, followed by a discussion of the alternative theoretical interpretations. I conclude with some recommendations for future empirical inquiries in this area.

Empirical Findings

The distinction between Big-C and little-c creativity has consequences for the type of research that is conducted regarding the association with bilingualism. For more commonplace forms of creativity, an investigator can use psychometric methods. In particular, bilinguals and monolinguals can be directly compared according to how they score on various tests that purport to measure creativity (Simonton, 2003b). In the case of highly-acclaimed acts of creativity, this approach becomes more difficult. Because a large proportion of the creative geniuses of world history are deceased or otherwise inaccessible, it is often necessary to rely on historiometric methods (Simonton, 1999b). In this approach biographical and historical data are quantified into variables and the variables are then subjected to multivariate statistical analyses. Moreover, unlike the psychometric research, historiometric investigations often address the question indirectly. As a consequence, I present the historiometric findings before turning to the psychometric findings.

Historiometric Research

Historiometric inquiries pertinent to the creativity-bilingualism issue can be assigned to two distinct categories: aggregate and individual. In the first group are studies that examine how creative activity a given nation or civilization clusters over historical time, whereas in the second group are studies that look more directly at the characteristics of creative geniuses. Although the two approaches are very different, they both lend indirect support to the idea that creativity might be associated with bilingualism.

Aggregate Level

Historic creators are not randomly distributed across historical time. Instead they are most likely to be grouped together in the same or at least contiguous generations (Kroeber, 1944; Simonton, 1975, 1988; Sorokin & Merton, 1935). In other words, creative activity tends to cluster into Golden Ages separated by Dark Ages. Conspicuous examples include the Golden Age of Greece and the Italian Renaissance. But what are the factors that cause creative geniuses to appear in some periods and not others? Historiometric research has divulged a large number of influential factors, most of which have nothing to do with the question that drives this chapter (Simonton, 2003a). Nonetheless, some influences have the potential of implicating the positive impact of heightened levels of bilingualism during Golden Ages. Consider the following pair of findings.

First, creative geniuses are less likely to appear when a civilization area is dominated by a single imperial state (Naroll et al., 1971; Schaefer, Babu, & Rao, 1977; Simonton, 1975, 1976). Stated

differently, genius-grade creativity is more prominent when a civilization is made up of numerous independent nations (see also Kroeber, 1944; Sorokin, 1969; Toynbee, 1946). It is for this reason that nationalistic revolts and rebellions against imperial rule tends to resuscitate the level of creative activity (Simonton, 1975). It is no accident that the Golden Age of Greece not only appeared when that civilization was divided into many city-states or poli, but also came upon the heals of the revolt against the Persian Empire, which held sway over Ionian Greece. Yet it is telling that this connection between nationalism and aggregate creativity only holds for polyglot civilizations, that is, for those that contain a great many distinct languages. For instance, although the relation is found in Europe and India, it is not found in China (Ting, 1986). Yet China is distinctive in being a civilization that has been largely dominated by imperial states that have imposed a single official language over a large geographical area. Hence, the critical factor may be the degree that a civilization area is overtly multilingual, a condition that might encourage higher frequencies of bilingualism.

Second, and in partial support for the last conjecture, creative geniuses have a higher probability of appearing in times of cultural heterogeneity (Simonton, 2003a). This relation was indicated in a study of the distribution of eminent creators and leaders in Japanese civilization (Simonton, 1997). Creative geniuses were most likely to cluster after Japan had been open to foreign influences. This influx of alien culture could assume three forms: (a) foreign immigrants who left a mark on Japanese history, such as Chinese Buddhist monks, Korean artists, and Christian missionaries; (b) eminent Japanese who traveled abroad, that is, who left the main islands of Japan to visit civilized regions like China, Korea, Europe, or the United States; and (c) outside influences in which native Japanese studied under foreigners, went abroad to study, or admired, developed, or imitated the style or ideas of foreigners. What renders these three measures particularly interesting is that they would in all likelihood be associated with increased amounts of bilingualism. This would certainly be the case for foreign immigrants living in Japan and eminent Japanese who traveled and even studied in foreign lands.

One feature of the previous two findings deserves special emphasis, namely that the effects tend to appear after a certain amount of delay (Simonton, 2003a). More specifically, it seems that these effects appear to operate during the period in which an individual is acquiring creative potential. By inference, then, exposure to bilingualism in childhood and adolescence may contribute to creative development. Admittedly, this conclusion is highly tentative. Even so, the inference receives some additional support from individual-level findings.

Individual Level

In line with the positive influence of immigration in Japanese civilization, many social scientists have speculated about the importance of human migration, an event that introduces *marginal* individuals who might be especially innovative in their adopted culture (Campbell, 1960; Park, 1928). Indeed, in 1869 Francis Galton had already conjectured that a disproportionate number of geniuses in any given nation tended to have foreign names. Historiometric investigations show that these speculations receive some empirical endorsement. For instance, one study of over 300 eminent twentieth-century personalities found that an unusual percentage were first- or second-generation immigrants (Goertzel, Goertzel, & Goertzel, 1978; see also Bowerman, 1947). Likewise, another investigation of Nobel laureates divulged that almost all "Have carried out study courses abroad, either as students, research workers, or professors" (Moulin, 1955, p. 261).

It is worth noting that studies using more conventional methods have also revealed the relation between foreign influence and eminence. This association holds for eminent scientists, as an example (Eiduson, 1962; Helson & Crutchfield, 1970; Visher, 1947). A recent study of illustrious

U.S. scientists in the physical and life sciences concluded that "individuals making exceptional contributions . . . are disproportionately drawn from the foreign born" and "are also disproportionately foreign educated, both at the undergraduate and graduate level" (Levin & Stephan, 1999, p. 1213). These findings suggest the bilingualism-creativity association to the extent that the foreign born came from countries that did not have English as the official language or that the foreign educated received their training in countries that similarly did not have English as the official language.

Psychometric Research

Unlike historiometric research, psychometric investigations invariably involve individual-level units of analysis. Specifically, individuals identified as either monolingual or bilingual are tested on any of a variety of creativity tests. Most often the creativity scores come from some measure of divergent thinking, an ability closely associated with creativity (Guilford, 1967). In particular, divergent thinking entails the capacity to generate a multitude of alternative responses to a given stimulus. A typical example is the Unusual Uses test in which an individual must generate as many uses as possible for a commonplace item, such as a toothpick or paperclip. The responses may then be scored for fluency (the number of different uses generated), originality (the rarity of the suggested use), flexibility (the number of categories of functions generated), and elaboration (the amount of detail provided to explain the use). Of course, in line with the definition of creativity, the suggested functions must work. Saying that a paperclip might be used to put an astronaut on Mars is not going to count as a legitimate response.

The most recent review of the literature identified 24 studies of the relation between bilingualism and creativity or divergent thinking (Ricciardelli, 1992). Although this review article is now over a dozen years old, almost no research directly relevant to this topic has been published since then, making its results still pertinent to the present discussion (see also Hamers & Blanc, 2000). It is significant, then, that 20 investigations found that bilinguals held the advantage over monolinguals with respect to creativity. Of the 4 exceptions, 3 found that monolinguals were more creative than the bilinguals, and 1 found no difference. Hence, overall the empirical literature supports the conclusion that bilingualism and creativity are positively correlated. However, scrutinizing the accumulated findings more closely, the affirmative research on the creativity-bilingualism relation can be grouped into two categories, namely, (a) those that find unequivocally positive support and (b) those that find more ambiguous support.

Positive Support

An example of research in this category is an early study of high school students of Mexican origin (Carringer, 1974). A dozen were bilingual in Spanish and English, whereas another dozen were monolingual in Spanish. All youths took four subtests from the Torrance Tests of Creative Thinking, including both verbal and figural (nonverbal) assessments (for instrument descriptions, see Crammond, 1994; Torrance, 1988). The bilinguals scored higher than the monolinguals on verbal originality and flexibility and on figural originality and fluency. In no case did the monolinguals significantly surpass the bilinguals. In addition, gender had no effect, whether as a main effect or in interaction with bilingual-monolingual status.

Although this investigation indicated that the association between bilingualism and creativity is fairly robust—transcending both type of creativity (verbal versus figural) and gender (male

versus female)—other inquiries suggest that the relation is more narrow. For instance, one study scrutinized the connection between bilingualism and divergent thinking in a more extensive sample of 289 Welsh and Nigerian school children between the ages of 9 and 11 (Okoh, 1980). In this case the bilinguals only performed significantly better on verbal creativity tests, whereas bilinguals and monolinguals did equally well on the nonverbal creativity tests. This disparity seems compatible with the salient fact that bilingualism represents a linguistic or verbal capacity. Yet with that sole restriction, the outcome can be considered fairly unambiguous.

Finally, in the category of positive support may be placed the only directly relevant empirical investigation that was published since Ricciardelli's (1992) literature review, namely a study by Karapetsas and Andreou (1999; cf. Fleith, Renzulli, & Westberg, 2002; López, Esquivel, & Houtz, 1993). This study did not directly compare bilinguals and monolinguals but rather contrasted fluent with nonfluent bilinguals, where all participants were native speakers of Greek who had learned English as a second language. The fluent bilinguals surpassed nonfluent bilinguals on all cognitive tests, including a measure of creativity. Thus, the difference that separates bilinguals from monolinguals also separates bilinguals who vary in the level of mastery.

Ambiguous Support

Other investigations have obtained more mixed, even contradictory results—albeit they still lean in favor of a positive link between creativity and bilingualism. For instance, one inquiry administered the figural forms of the Torrance Test of Creative Thinking to 1,063 third, fourth, and fifth graders in Singapore (Torrance, Gowan, Wu, & Aliotti, 1970). The children were either monolingual or bilingual in Chinese and Malayan. Depending on the specific assessments examined—originality, fluency, flexibility, and elaboration—either the monolinguals or the bilinguals were superior. Only after correction was introduced for the number of responses did the bilinguals come out superior to the monolinguals on a subset of the measures, most notably the originality assessment. In other words, the bilingual superiority only emerged after the data were subjected to some statistical manipulation.

An ambiguity of a different nature is illustrated in Landry's (1973) study of 128 second, fourth, fifth, and sixth graders from two distinct schools, one with an instruction program in a foreign language and the other without (see also Landry, 1972). Again the measures were taken from the Torrance Tests of Creative Thinking (Product Improvement and Unusual Uses subtests). Significantly, because it would be expected that the effects of language instruction should take some time to emerge, no differences appeared between the two schools in the case of the second graders. Unfortunately, the developmental trajectories thereafter were moderated by gender, yielding a crossover interaction. Specifically, boys from the school without the language program had the highest scores on creativity, whereas those with the second highest creativity scores were the girls from the school with the language program. There was no main effect for either gender or the type of school. Although the result for the girls is clearly consistent with the hypothesized relation, that for the boys is not.

Methodological Considerations

To appreciate better the implications of the foregoing findings it is necessary to consider several methodological issues. These issues concern (a) psychometric assessments, (b) conceptual definitions, (c) study participants, (d) research designs, and (e) confounding variables.

Psychometric Assessments

Although researchers have reached a fairly firm consensus on the definition of creativity, they are much less in agreement about the most appropriate measurement approach. In fact, a multitude of operational definitions exist, each with its own distinct advantages and disadvantages (Hocevar & Bachelor, 1989; Simonton, 2003b). These pros and cons are especially problematic in the case of psychometric assessments.

In the first place, a complete evaluation of the psychometric research must consider the crucial problem of predictive validity. A test has predictive validity if performance on that test correlates with appropriate criteria. For instance, a measure of scholastic aptitude should be positively related with grades in school. Unfortunately, by this standard, scores on standard creativity tests do not correlate very highly with various external criteria of creativity, whether subjective ratings or objective behaviors (Hocevar & Bachelor, 1989; Simonton, 2000). As a result, the correlations found between bilingualism and test performance may not be equivalent to asserting that bilinguals are more creative than monolinguals. To be sure, because the historiometric research deals with Big-C rather than little-c creativity, the creative status of the individuals studied cannot be questioned. Yet no historiometric study to date has ever directly examined the bilingualism-creativity association. As observed earlier, the inference of such a relation is only tenuous and indirect.

Just as critical is the fact that the most common *creativity tests* have relatively minimal convergent and divergent validity (Hocevar & Bachelor, 1989; McNemar, 1964; Michael & Wright, 1989). The criterion of convergent validity means that alternative psychometric measures correlate highly with each other, whereas the criterion of divergent validity means that the creativity measures correlate less well with comparable measures that assess different constructs. Yet the various creativity tests do not correlate very highly with each other, and often they correlate very highly with intelligence tests. In fact, the correlations among creativity measures are frequently about the same size as the correlations between the correlation measures and standard intelligence tests. Hence, it is often unclear whether the instruments that purport to assess creativity are really measuring the same thing or, if they are, whether they are measuring something distinct from general mental ability.

Perhaps the low convergent validity of alternative creativity measures is more problematic than their low divergent validity. After all, if various psychometric instruments agree so little, then the empirical outcomes may be contingent on the specific measure used. What renders this contingency especially irksome is that virtually all psychometric inquiries into the bilingualism-creativity association rely on some kind of divergent thinking test, most frequently one or more of the subtests of the Torrance Tests of Creative Thinking (see Crammond, 1994). Yet a multitude of alternative assessment strategies have been completely ignored (Simonton, 2003b). These include the Remote Associates Test (Mednick, 1962), the Consensual Assessment Technique (Amabile, 1982), the Creative Personality Scale (Gough, 1979), the Creative Temperament Scale (Gough, 1992), the Barron-Welsh Art Scale (Barron & Welsh, 1952), the Lifetime Creativity Scales (Richards et al., 1988), and the How Do You Think Scale (Davis, 1975). Rather than assess divergent thinking, these tests gauge a person's personality, self-concept, hobbies and interests, openness to experience, and overt behaviors that bear some connection with genuine creativity. It is conceivable that one of these scales is actually more pertinent to addressing the bilingualism-creativity relation than are the scales most frequently encountered in the empirical literature.

Conceptual Definitions

Bilingualism is a complex concept that can be defined a number of different ways (Hamers & Blanc, 2000). In the first place, bilinguals can differ in how they learned the two languages. One circumstance is when a child acquires the languages simultaneously, perhaps one from the mother and the other from the father. Alternatively, one language might be the individual's native tongue, whereas the other might be learned as a second language in adolescence or even adulthood. Even in this case it would make a difference whether the second language was acquired while still immersed in the native-language community (e.g., a student taking a foreign language course) or acquired while immersed in a community in which the second language dominates (e.g., a foreign exchange student).

Even more critical perhaps is the nature of the proficiency. Those who are fluent in their native language may not necessarily be fluent in their second language, especially if the latter is acquired in adulthood rather than childhood. Even if bilinguals can be said to be fluent in both languages they may not be fluent in the same manner. For instance, a second-generation immigrant child might be fluent in family discussions at home (using the first language) and equally fluent in academic discussions at school (using the second language), and yet be largely incapable of discussing academic subjects at the family dinner table (in the first language). In other words, the linguistic mastery may not be exactly parallel, the native language being used in one context and the second language being used in the other.

Some of this conceptual diversity is seen in the psychometric research on the creativity-bilingualism association. Indeed, Ricciardelli's (1992) literature review concluded that this variation was the main cause of the contradictory findings. Creativity is only associated with bilingualism when proficient bilinguals are contrasted with monolinguals, whereas no difference emerges when nonproficient bilinguals are compared with monolinguals (cf. Lemmon & Goggin, 1989). Stated differently, the bilingualism must be balanced, the two languages providing more or less equivalent and interchangeable means of communication (see for example Cummins, 1977; Price-Williams & Ramirez, 1977). This stipulation has critical implications for the theoretical interpretation of the relationship, as will be seen shortly.

Study Participants

The subjects in the historiometric investigations are extremely diverse with respect to both geographic and historical origins. The participants in the psychometric studies are necessarily much less diverse historically, given that the tests must be administered on contemporary populations. Nonetheless, the samples seen in psychometric research are quite varied geographically. This variety is apparent in the range of languages in which research participants have been bilinguals or monolinguals. In particular, the languages include Chinese, Czech, English, French, German, Greek, Italian, Kannada, Malayan, Polish, Spanish, Tamil, Ukrainian, Welsh, and Yorubo (Ricciardelli, 1992).

Yet in one critical manner the samples used in the psychometric research have not been very diverse: Research participants are most often school children of various ages, most frequently in primary or elementary school. For instance, out of the 24 studies summarized in Ricciardelli's (1992) review, only 4 had samples that contained teenagers, and not a single study included adults. Since that article, in fact, only one psychometric inquiry has drawn upon adult populations (Karapetsas & Andreou, 1999). This emphasis on preadolescent populations appears all the

more striking given how frequently psychologists rely on college students for their subject pools. Now this severe restriction has two significant consequences for testing the bilingualism-creativity association.

First, several widely used creativity measures are specifically designed for adult populations (e.g., Gough, 1979; Mednick, 1962). These instruments also have the advantage of having had their predictive validity established with respect to adulthood creative performance—a criterion of more relevance than childhood creative activities.

Second, the primary focus on preadolescent participant samples imposes undesirable constraints on the operational definition of bilingualism. A child who is fluent in a language cannot display the same proficiency as an adult who is fluent in the same language, and the same conclusion obviously holds for childhood versus adulthood bilingualism. Especially conspicuous are the vocabulary differences that distinguish the language competences of children and adults.

Given these two repercussions, it is likely that the hypothesized relation between bilingualism and creativity has not received a complete and fair evaluation in the research published thus far.

Research Designs

It was already pointed out that historiometric research has adopted two major methodological approaches, namely the aggregate and the individual. Psychometric research, in contrast, focuses exclusively on the individual. Furthermore, researchers who use psychometric methods almost invariably use cross-sectional designs. That is, individual differences in creativity are correlated with individual differences in bilingualism (e.g., bilingual versus monolingual or fluent bilingual vs. nonfluent bilingual). Yet it is well known that *correlation does not prove causation*. A bivariate correlation that establishes a relationship between two variables of interest cannot by itself establish the direction of the causal relation, or even that a causal relation exists. In other words, causal inferences in cross-sectional designs have low internal validity (Campbell & Stanley, 1966). Internal validity concerns the confidence that can be placed in the inference that one variable can be considered a cause of another variable.

The validity of causal inferences can be rendered more firm by introducing time explicitly into the analysis. In particular, investigators can employ some kind of longitudinal design. Changes in creativity could then be observed as a person increases bilingual proficiency. For example, creativity tests might be administered to a fixed group of students as they advance through the full series of language courses. A cross-lagged design can even be used to determine whether improvements in second language competence anticipate growth in creative performance (see for example Burkholder & Harlow, 2003). In simple terms, if bilingualism nurtures creativity, then the relationship between bilingualism at time 1 and creativity at time 2 should be much stronger than the relationship between creativity at time 1 and bilingualism at time 2.

Of course, it is also necessary to have a control group consisting of students who are not taking language courses so as to rule out maturational effects. This necessity is all the more mandatory given that creative development is nonmonotonic, with spurts and dips that might incidentally correspond with the onset of foreign language training (Runco & Charles, 1997).

Notwithstanding the patent superiority of longitudinal designs, such research is extremely rare in this area (Hakuta & Diaz, 1985).

Confounding Variables

Instead of genuine longitudinal designs, some researchers will adopt the strategy of looking at participants who vary in the degree of second-language learning, such as consecutive grades of foreign-language instruction (e.g., Landry, 1973; Torrance et al., 1970). However, because the students in one grade are not the same students in another grade, the empirical findings can be riddled with methodological artifacts. For instance, college-bound students may take more advanced language classes than those who are not, the former differing on a host of other characteristics, such as intelligence, ambition, and socioeconomic class. One or more of these latter attributes may then be correlated with performance on standard creativity tests. The correlation between bilingualism and creativity accordingly becomes the spurious consequence of these confounding variables.

Needless to say, confounds such as this can take place in any correlational study, whether cross-sectional or longitudinal. Indeed, confounding factors can intrude in both historiometric and psychometric investigations. A good example that applies to both research strategies is the relation that exists between an individual's bilingualism and his or her status as an ethnic minority. Although being a member of a minority group is frequently associated with bilingualism, as a person is obliged to learn the language of the majority culture while preserving their ties with the minority culture, such an identity can often be associated with other conditions that militate against creative development. Most obviously, the minority group may be subjected to overt or covert discrimination, prejudice, and oppression. This may help explain why historiometric research indicates that creative activity is positively correlated with political fragmentation as well as with revolts and rebellions against imperial states (Naroll et al., 1971; Schaefer et al., 1977; Simonton, 1975, 1976). In fact, Danilevsky, the Russian historical philosopher, proposed a *second law of the dynamics of great cultures* that asserted that "in order for the civilization of a potentially creative group to be conceived and developed, the group and its subgroups must be politically independent" (Sorokin, 1969, p. 543).

Even if a minority group cannot attain total political independence, it must at the very least attain certain basic freedoms. This necessity is illustrated by historiometric research on the creative contributions of European Jews. It is clearly evident that Jews have been more creative on a per capita basis than have members of the majority Christian community (Arieti, 1976; Hayes, 1989; Veblen, 1919). For example, distinguished scientists are more likely to emerge from Jewish families (Berry, 1981; Cole & Cole, 1973; Feist, 1993; Helson & Crutchfield, 1970; Roe, 1953). Indeed, Jews have received a disproportionate share of Nobel Prizes in the sciences (Berry, 1999; Zuckerman, 1977). Insofar as European Jews were often exposed to multiple languages—Hebrew and/or Yiddish plus the official language of the nation in which they resided—this preponderance may be taken as indirect evidence on behalf of the thesis that bilingualism is positively correlated with creativity. Yet there is a significant qualification: The Jewish advantage is contingent on their receiving basic civil rights in the nation of residency. For instance, Jews in Switzerland had much more freedom than those in Russia. Accordingly, on a per capita basis Swiss Jews are 83 times more likely than Russian Jews to win a Nobel Prize in the sciences (Berry, 1981). Speaking more generally, to the extent that bilingualism is associated with differences in economic, political, social, or cultural deficits, its potentially positive impact on creativity may be obscured and even reversed.

Given that so many bilinguals in the United States belong to economically and politically disadvantaged minorities—some Spanish-speaking subcultures providing the most notable examples—

it is conceivable that the connection between bilingualism and creativity would become more pronounced once due corrections were introduced for this confounding factor.

Theoretical Interpretations

Given some of the preceding methodological considerations, it may seem premature to discuss possible theoretical explanations for any connection between bilingualism and creativity. Nonetheless, it is important to discuss these potential interpretations in order to appreciate the scientific rational for conducting research on this topic. This appreciation may then help motivate future investigators to address this question without some of the methodological limitations that characterized earlier studies. In any case, the various interpretations of the relation can be grouped into two categories: causal effects and spurious relations.

Causal Effects

Most researchers who carry out research in this area have the working hypothesis that bilingualism and creativity have a direct causal connection (Hamers & Blanc, 2000; Ricciardelli, 1992). Most commonly it is assumed that bilingualism enhances creativity, or rather that the acquisition of two or more languages contributes directly to creative development. These positive contributions could ensue from both syntactic and lexical contrasts between two languages.

On the syntactic side, because different languages will often feature radically different grammatical structures, bilinguals may be more likely to acquire increased cognitive flexibility that frees the thought processes from potential linguistic constraints (Mohanty & Babu, 1982). At the same time, the syntactic requirements of a second language may make a bilingual more sensitive to concepts that are not emphasized in the first language. For instance, native speakers of English who learn Spanish must become adept in conceiving verbs in the subjunctive mode, a grammatical nicety much less prominent in English than in Spanish. In particular, in Spanish a verb may change form if it is contingent on an emotional state, personal volition, or uncontrollable chance. Acquired linguistic sensitivity to these distinctions then can have positive consequences for how a person perceives the psychological states and probabilistic conditions that underlie subjunctive grammatical constructions.

From the lexical perspective, bilinguals, in contrast to monolinguals, have acquired alternative coding schemes, and thus become aware of the arbitrary nature of any one linguistic representation (see for example Mohanty & Babu, 1982). After all, any given object in the environment will have at least two alternative linguistic labels. Perhaps even more significant is the fact that it is seldom possible to establish a one-to-one correspondence between the two vocabularies, a word in one language often having secondary meanings that do not map onto the secondary meanings of the supposedly equivalent word in the other language. This lack of complete semantic correspondence may stimulate the capacity for generating numerous and unusual associations, a capacity often claimed to provide the basis for creative thought (Gough, 1976; Mednick, 1962; Simonton, 2004). Certainly a bilingual will have access to richer semantic networks to the extent that words can prime more than one set of denotations and connotations.

It is essential to emphasize that for the foregoing consequences to hold, bilinguals should display a balanced proficiency in both languages (Ricciardelli, 1992). If an individual is fluent in one language but hesitant in another, then it is unrealistic to believe that the person possesses two

alternative coding schemes. Likewise, if the two languages are used in totally different settings, such as home versus school, the assumption supporting this explanation has not been met. By the same token, the effects of balanced bilingualism should be greater for adults than for children because of the more extensive nature of adulthood proficiency. For instance, an adult enjoys a richer vocabulary than does a child, thereby providing more correspondences between the two lexical systems.

Although this notion of balanced proficiency emerged in the psychometric literature, the same idea may facilitate understanding of historiometric results as well. Specifically, it could be argued that when an imperial state imposes a single language on civilization area rich in native languages, it necessarily discourages the development of balanced bilingualism. An official language of the empire will predominate in public affairs—politics, business, and education—while a native or primary language will be limited to private affairs, confined largely to use in familial and intimate relationships. So the two coding schemes will not be balanced, no matter how fluent the speaker may be in either linguistic context. Moreover, speakers of the dominant tongue will have little or no incentive to master any of the languages spoken by the peoples who submitted to imperial rule. In circumstances of political fragmentation, in contrast, the primary language will have to be far more extensive in application, while at the same time a specific language will necessarily emerge as a lingua franca for interchanges between separate linguistic communities. For instance, after the fall of the Roman Empire the various Romance languages evolved from *vulgar* to official tongues, while a secondary language served as a means of broader exchange. At various times and places these languages included Latin, French, German, and English.

According to the interpretation just offered, bilingualism has a direct causal effect on creativity. Nevertheless, it is possible that the effect is indirect. That is, the acquisition of a second language may influence the development of some other variable that then has a direct impact on the growth of creative potential. For instance, creativity is positively related to other cognitive skills, such as general intelligence (Barron & Harrington, 1981; Haensly & Reynolds, 1989). Yet some studies have found an association between bilingualism and intellectual ability (e.g., Lambert, Tucker, & d'Anglejan, 1973; Mohanty & Babu, 1982; Peal & Lambert, 1962). Therefore, it could be argued that bilingualism enhances creativity through the mediating variable of intellectual development. By increasing relevant cognitive capacities, bilingualism can indirectly stimulate the creative processes that are dependent on those capacities. However, because intelligence is a necessary but not sufficient basis for creativity, under this causal scenario bilingualism would not always have this consequence.

Intelligence is not the only possible mediating variable. We should not overlook the fact that language acquisition almost invariably includes significant exposure to an alien culture. In fact, rationales for having language training in schools and colleges often cite the advantages to be gained from familiarity with the distinct customs, histories, heritages, and literatures of other nations. By broadening a person's worldview, such familiarity can then help the individual escape the conventions and conformity pressures that can severely constrain creative thought and behavior (Crutchfield, 1962; Maslow, 1959; Simonton, 1999a). According to this account, it is not language acquisition per se that contributes to creative development but rather it is the cultural materials that are associated with the learning of a second language. Although language courses provide the opportunity, the cultural exposure may serve as the proximate cause of creative growth. It should be noted that this interpretation can account not only for the psychometric findings, but for the historiometric findings besides. Political fragmentation, nationalistic rebellions against imperial rule, and cultural heterogeneity resulting from openness to foreign cultures can all be considered conditions that foster bicultural and even multicultural experiences.

Spurious Relations

Although the interpretation just given views bilingualism as having an indirect effect on creativity via bicultural experiences, it could actually be the case that any correlation between bilingualism and creativity is actually spurious rather than causal. That is, each may be the consequence of the same underlying cause. Furthermore, one candidate for that third variable may be the very bicultural experiences that provided the mediating variable in the previous explanation. This possibility becomes readily apparent when we consider the repercussions of immigration to a foreign land. Clearly immigrants must become assimilated to a new cultural system, and in many instances this assimilation will include the acquisition of a new language. Yet the bicultural experience may prove more powerful as a developmental factor than the bilingual experience.

This superior impact is most obvious in the case of those immigrants who are natives of a nation that speaks the same language as their new home country. A person who settles in California from, say, the English Midlands, may find that adjustments to North American culture are far more extensive than the accommodations that must be made to the distinct dialect spoken in that region of the United States. Nevertheless, it could be argued that the primacy of the bicultural influence even holds for immigrants coming from countries that speak languages quite different from that of their new homeland. For instance, a Muslim who immigrates to the United States from the Middle East may find the cultural differences between their original and adopted countries much more challenging than the linguistic differences between English and Arabic, Turkish, or Persian.

It should be evident that this interpretation would account for the finding in historiometric research that first- or second-generation immigrants are overrepresented among outstanding achievers in a given nation. Indeed, this interpretation would be more general in application because it would not require that the individuals come from different linguistic backgrounds. Moreover, the same theoretical account could accommodate those empirical findings that suggest that members of English-speaking minority groups within the United States may nonetheless exhibit some benefit of development within a subculture that diverges from the majority culture (Price-Williams & Ramirez, 1977). To be specific, African Americans may display enhanced creativity even though the differences between Black culture and White culture may be more critical than the differences between Black dialect and standard (White) English.

Even so, bicultural or multicultural exposure is not the only factor that might introduce a spurious relation between bilingualism and creativity. A more cognitive or dispositional variable might do just as well. A case in point is openness to experience, an individual-difference variable that is part of the *Big Five* personality factors (along with extraversion, agreeableness, conscientiousness, and neuroticism; see John, 1990). According to empirical research, this variable has a conspicuous association with creativity (McCrae, 1987). Yet it can also be argued that the same factor makes a positive contribution to the acquisition of a second language. To master a new language requires that an individual be open to strange syntactic structures, seemingly illogical idiomatic expressions or figures of speech, and false cognates (words that look very similar to words in one's native language but have totally different meanings). Consequently, those who are more open will probably attain a higher level of proficiency in a second language and will also be more prone to exhibit higher levels of creativity. The correlation between bilingualism and creativity becomes a mere spurious upshot of the underlying factor of experiential openness.

Summary and Conclusion

In this chapter I have reviewed, evaluated, and interpreted the empirical research on the relation between bilingualism and creativity. After first defining creativity, I observed that the phenomenon assumes two major forms: Big-C and little-c creativity. This distinction has methodological consequences: Historiometric techniques are used for the former whereas psychometric techniques are used for the latter. As a consequence, the review of the empirical findings was broken down into two sections.

In the first, it was shown that historiometric research provides indirect support for the conclusion that some connection exists between bilingualism and the appearance of creative genius across history. At least the political, social, and cultural conditions that are most likely to support Golden Ages of creative activity would also seem supportive of a polyglot rather than linguistically homogeneous civilization. Likewise, historiometric studies of creative geniuses indicate that they are likely to have developmental experiences that would lend themselves to bilingualism. For instance, a significant proportion of these notable creators first- or second-generation immigrants, and a large proportion had experience studying abroad.

The next section dealt with the psychometric research. Here measures of creativity or divergent thinking are administered to contemporary individuals who vary in their proficiency in two languages. The vast majority of investigations find a positive relation between bilingualism and creativity, albeit some of the studies yield ambiguous outcomes. For instance, the relation might be contingent on the introduction of statistical controls or moderating variables, such as gender.

To understand better the meaning of these results, I then considered five crucial methodological issues. The first concerned the nature of the psychometric assessments typically used to gauge creativity. The second pertained to the conceptual definitions of bilingualism favored by various investigators. The third issue concerned the type of participants that make up most psychometric samples, while the fourth concerned the nature of the research designs most frequently employed. Finally, the fifth concern involved the intrusion of various confounding variables. In general, the research was found to suffer from severe methodological limitations. For example, the psychometric inquiries depend too heavily on a single set of measures, ignoring many others that are just as good or better. Moreover, these same investigations often define bilingualism in very different ways, and rely too much on samples consisting of elementary school children. Making causal interpretations even more difficult, almost all investigations utilize cross-sectional rather than longitudinal designs, and all too often inferences are contaminated by various confounding variables, such as intelligence, socioeconomic status, or ethnicity.

Because of these methodological complications, theoretical interpretation of the empirical results must be inconclusive at this time. Nevertheless, it is at least possible to indicate the principal explanatory alternatives. These fall primarily in three categories.

First, bilingualism might cause creativity. That is, the acquisition of two or more languages could contribute to creative development. This effect could be either direct or indirect. In the former instance, bilingualism might directly influence the processes underlying creative thought, such as remote association. In the latter instance, bilingualism might enhance a factor, such as general intelligence, that has a positive association with creativity.

Second, the correlation between bilingualism and creativity may be spurious. In other words, both variables may be a function of some third factor. That underlying cause might be bicultural or multicultural experiences that are correlated with both bilingualism and creativity even when bilingualism features no causal relation with creativity. Alternatively, individual differences in openness to experience, which have been shown to correlate with creative ability, may also be

associated with the capacity for second language acquisition.

By now one conclusion should be quite clear: A great deal of research remains to be done before it is possible to understand completely the connection between bilingualism and creativity. Therefore, it must be considered a misfortune that interest in this empirical question has somewhat waned over the years. As pointed out earlier, only one relevant investigation has been published since 1992, when the first literature review was published on the subject. Accordingly, I wish to end this chapter by indicating what I consider the most fruitful directions for future research. These may be enumerated in the following seven recommendations:

1. Genuine longitudinal studies are needed rather than almost exclusively rely on cross-sectional designs. It becomes much easier to tease out the direction of causality when time is introduced into the methodology. Moreover, it may be especially valuable to have these longitudinal inquiries extend all the way to early adulthood when bilingual proficiency and balance are likely to be maximized.
2. Psychometric investigations should use a much wider range of creativity measures rather than depend so heavily on a small number of divergent thinking tests. In addition, such inquiries should more frequently employ instruments designed for adults rather than focusing so excessively on instruments tailored for children.
3. Apropos of the second recommendation, samples should be broadened to include older persons. At present far too many psychometric studies use samples of children, while adolescents and adults are largely neglected. Yet the creativity of adults is probably more important to society than the creativity of children.
4. Historiometric investigations should investigate more directly the connection between bilingualism and creativity. For instance, researchers might examine more closely the relation between creative genius and proficiency in two or more languages (cf. Raskin, 1936; White, 1931).
5. All inquiries, whether psychometric or historiometric, should take better care to control for the contaminating effects of various confounding variables. Introducing these controls will help investigators determine whether the correlation between bilingualism and creativity is causal rather than spurious in nature.
6. Assuming that a causal connection actually exists, researchers should investigate whether the causal relation is direct or indirect. If the latter is the case, investigators must determine the mediating variable or variables. Only after the causal network is successfully deciphered will it be possible to provide a secure theoretical interpretation of the empirical findings.
7. Once a sound theoretical understanding is obtained, research can turn to a more practical direction. In particular, investigators can examine whether certain modes of second-language instruction are more conducive to creative development. For example, it is possible that instruction that freely alternates back and forth between two languages serves to stimulate creativity more than instruction that focuses exclusively on the newly acquired language (i.e., *total immersion* programs). More specifically, extensive two-directional verbal and written translation exercises may have the most beneficial impact on creative development.

It should be obvious that the neglect of this subject over the past decade or so is quite unjustified. The early results, however promising, are incomplete, and beg for more detailed, sophisticated, and systematic scrutiny. Just as important, the substantive question at hand has probably become even more urgent than ever before. With the increased mobility of human populations, with the communication opportunities offered by modern technology, and with the accelerating globalization

of the world economy, bilingualism is likely to become more rather than less prominent. Therefore, it is essential to learn what the consequences of that trend might be, including whether creative activity is likely to grow, stagnate, or decline. Indeed, if creativity marks a significant consequence of bilingualism, then governmental policies may even want to promote proficiency in two or more languages. Hence, scientific knowledge about the relation between bilingualism and creativity may have practical ramifications.

List of Key Words and Concepts

Aggregate data, Big-C Creativity, *Big Five* personality factors, Divergent, Functional, Genius, Historiometrics, Little-c creativity, Psychometrics, Thinking, Torrance Tests of Creative Thinking, Unusual Uses test.

Internet Sites Related to Bilingualism and Creativity

American Creativity Association: http://www.amcreativityassoc.org/
Bilingualism and Intelligence: http://ccat.sas.upenn.edu/%7Eharoldfs/540/bilingtl/bilingtl.html
Brain Connection: http://www.brainconnection.com/topics/?main=fa/cognitive-bilingualism2
Creativity and Giftedness: http://nccrest.edreform.net/resource/9460
eReviews in Applied Linguistics: http://www.eral.ucsb.edu/master_list/index.php?review=83

Discussion Questions

1. Creativity is not a discrete ability that you either have or don't have. Rather it represents a continuum from Big-C creativity to little-c creativity. But do you think that there are major thresholds along that continuum that mark major divisions? For example, if someone likes to paint, at what point would one say that he or she passes from little-c to Big-C? When the paintings are first shown at a local gallery? When the first painting is sold? When the paintings are first shown at a major art museum? When the painter receives his or her first commission to do a painting for a patron? When the artist has the first one-man show at a major art gallery? When the paintings become the subject for a major retrospective exhibit? When the creator has his or her work included in a history of modern art? When the average person on the street can recognize the name of the artist?
2. What is the difference between psychometric and historiometric research? What are the advantages and disadvantages of each method? How do they differ in what they tell us about the connection between bilingualism and creativity?
3. What are the sociocultural conditions that seem to favor the appearance of creative genius? How do these conditions relate to the likelihood of frequent bilingualism in a given society at a particular time?
4. What are the backgrounds of highly creative individuals? What are the potential implications of these backgrounds for understanding the possible role of bilingualism in nurturing creative development?

5. What kinds of tests are most frequently used to assess creativity in the research on bilingualism? What are the advantages and disadvantages of these measures? Are there any alternatives to what has become standard practice?
6. Does the psychometric research uniformly support a connection between creativity and bilingualism? If not, what are some of the discrepancies? What are some possible explanations for those discrepancies?
7. What are some of the central methodological concerns in research in this area? What are some of the consequences of these issues? What are some possible means of removing some of the more critical methodological problems?
8. What are the potential causal relationships between bilingualism and creativity? How can the actual causal relation be best determined in empirical research?
9. The chapter ends with some recommendations regarding future research. What are those recommendations? Which recommendations do you feel are most essential to deciphering the developmental relation between creativity and bilingualism?

Suggested Research Projects

1. Please visit http://www.math.yorku.ca/SCS/Online/paivio/ and select 20 high frequency nouns (hint: set the Kucera-Francis word frequency equal to 100, leaving the remaining entries blank). Get an extensive two-way dictionary of any two languages. For example, find a Spanish-English and English-Spanish dictionary. In the English-to-Spanish portion look up the Spanish words that correspond to the 20 listed words. Then look up those Spanish words in the Spanish-to-English section of the dictionary. Then repeat the translation process, going back and forth between the two languages. What happens? Do you always get the same words that were on the original list? Or are some new words added during each translation? If the latter takes place, are the new words merely synonyms for the words on the original list? Or do you come up with words that have meanings that do not correspond with any of the meanings of the words in first list? How might this affect a bilingual speaker's creativity, verbal or otherwise?
2. Find any book or other document that has two languages expressing the same meaning side-by-side, one in English and the other in a language for which you have a translation dictionary (as in the previous project). For example, at many bookstores you can purchase *parallel text* volumes of poetry, the original text printed on one side and the English translation on the other. Alternatively, often consumer products will contain directions and warnings in two or more languages, such as Spanish and English or, in Canada, French and English. In any case, use the dictionary to translate the non-English words in the first few sentences word-for-word. Now compare the results. Can you establish a one-to-one correspondence between the words in one language and words in the other? Are the words always in the same order or in a different order? Are there apparently unique ways of expressing an idea in one language that have no perfect correspondence in the other? What impact do you think these results have on a bilingual speaker's verbal flexibility and creativity?
3. Obtain translator software that claims to convert text from one language to another and in the reverse direction as well. Now input a straightforward text in one language and have it translated into the other. Then reverse the process, taking the translated text and "back translating" it into the original text. How does the original compare with the back translation? Are different words found in one than in the other? Do the words have the same

meanings? Do shifts occur in the order of the words? Do passages appear in the back-translated text that seem to have no obvious correspondence with the original text? What do these differences tell you about what it may be like to be a fluent speaker of two or more languages? Might those differences make the speaker more creative? Why?

Suggested Readings

Esquivel, G., & Houtz, J. (Eds.). (2000). *Creativity and giftedness in culturally diverse students*. Cresskill, NJ: Hampton Press.

López, E. C. (2003). Creativity issues concerning linguistically and culturally diverse children. In J. Houtz (Ed.), *The educational psychology of creativity* (pp. 107–127). Cresskill, NJ: Hampton Press.

Ricciardelli, L. A. (1992). Creativity and bilingualism. *Journal of Creative Behavior, 26,* 242–254.

References

Amabile, T. M. (1982). Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology*, *43*, 997–1013.

Arieti, S. (1976). *Creativity: The magic synthesis*. New York: Basic Books.

Barron, F. X., & Harrington, D. M. (1981). Creativity, intelligence, and personality. *Annual Review of Psychology*, *32*, 439–476.

Barron, F. X., & Welsh, G. S. (1952). Artistic perception as a possible factor in personality style: Its measurement by a figure preference test. *Journal of Psychology*, *33*, 199–203.

Berry, C. (1981). The Nobel scientists and the origins of scientific achievement. *British Journal of Sociology*, *32*, 381–391.

Berry, C. (1999). Religious traditions as contexts of historical creativity: Patterns of scientific and artistic achievement and their stability. *Personality & Individual Differences, 26,* 1125–1135.

Bowerman, W. G. (1947). *Studies in genius*. New York: Philosophical Library.

Burkholder, G. J., & Harlow, L. L. (2003). An illustration of a longitudinal cross-lagged design for larger structural equation models. *Structural Equation Modeling*, *10*, 465–486.

Campbell, D. T. (1960). Blind variation and selective retention in creative thought as in other knowledge processes. *Psychological Review*, *67*, 380–400.

Campbell, D. T., & Stanley, J. C. (1966). *Experimental and quasi-experimental designs for research*. Chicago: Rand McNally.

Carringer, D. C. (1974). Creative thinking abilities in Mexican youth. *Journal of Cross-Cultural Psychology*, *5*, 492–504.

Cole, S., & Cole, J. R. (1973). *Social stratification in science*. Chicago: University of Chicago Press.

Crammond, B. (1994). The Torrance Tests of Creative Thinking: From design through establishment of predictive validity. In R. F. Subotnik & K. D. Arnold (Eds.), *Beyond Terman: Contemporary longitudinal studies of giftedness and talent* (pp. 229–254). Norwood, NJ: Ablex.

Crutchfield, R. (1962). Conformity and creative thinking. In H. E. Gruber, G. Terrell, & M. Wertheimer (Eds.), *Contemporary approaches to creative thinking* (pp. 120–140). New York: Atherton Press.

Cummins, J. (1977). Cognitive factors associated with the attainment of intermediate levels of bilingual skills. *Modern Language Journal, 61*(1-sup-2), 3–12.

Davis, G. A. (1975) In frumious pursuit of the creative person. *Journal of Creative Behavior*, *9*, 75–87.

Eiduson, B. T. (1962). *Scientists: Their psychological world*. New York: Basic Books.

Feist, G. J. (1993). A structural model of scientific eminence. *Psychological Science, 4*, 366–371.

Fleith, D., Renzulli, J. S., & Westberg, K. L. (2002). Effects of a creativity training program on divergent thinking abilities and self-concept in monolingual and bilingual classrooms. *Creativity Research Journal, 14*, 373–386.

Galton, F. (1869). *Hereditary genius: An inquiry into its laws and consequences*. London: Macmillan.

Goertzel, M. G., Goertzel, V., & Goertzel, T. G. (1978). *300 eminent personalities: A psychosocial analysis of the famous*. San Francisco: Jossey-Bass.

Gough, H. G. (1976). Studying creativity by means of word association tests. *Journal of Applied Psychology*, *61*, 348–353.

Gough, H. G. (1979). A Creative Personality Scale for the Adjective Check List. *Journal of Personality and Social Psychology*, *37*, 1398–1405.

Gough, H. G. (1992). Assessment of creative potential in psychology and the development of a Creative Temperament Scale for the CPI. In J. C. Rosen & P. McReynolds (Eds.), *Advances in psychological assessment* (Vol. 8, pp. 225–257). New York: Plenum.

Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.

Haensly, P. A., & Reynolds, C. R. (1989). Creativity and intelligence. In J. A. Glover, R. R. Ronning, & C. R. Reynolds (Eds.), *Handbook of creativity* (pp. 111–132). New York: Plenum Press.

Hakuta, K., & Diaz, R. M. (1985). The relationship between degree of bilingualism and cognitive ability: A critical discussion and some new longitudinal data. In K. E. Nelson (Ed), *Children's language* (Vol. 5, pp. 319–344). Hillsdale, NJ: Lawrence Erlbaum Associates.

Hamers, J. F., & Blanc, M. H. A. (2000). *Bilinguality and bilingualism* (2nd ed.). Cambridge, Eng.: Cambridge University Press.

Hayes, J. R. (1989). *The complete problem solver* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Helson, R., & Crutchfield, R. S. (1970). Mathematicians: The creative researcher and the average Ph.D. *Journal of Consulting and Clinical Psychology*, *34*, 250–257.

Hocevar, D., & Bachelor, P. (1989). A taxonomy and critique of measurements used in the study of creativity. In J. A. Glover, R. R. Ronning, & C. R. Reynolds (Eds.), *Handbook of creativity* (pp. 53–75). New York: Plenum Press.

John, O. (1990). The "Big Five" factor taxonomy: Dimensions of personality in the natural language and in questionnaires. In L. A. Pervin (Ed.), *Handbook of personality theory and research* (pp. 66–100). New York: Guilford.

Karapetsas, A., & Andreou, G. (1999). Cognitive development of fluent and nonfluent bilingual speakers assessed with tachistoscopic techniques. *Psychological Reports, 84,* 697–700.

Kroeber, A. L. (1944). *Configurations of culture growth*. Berkeley: University of California Press.

Lambert, W. E., Tucker, G. R., & d'Anglejan, A. (1973). Cognitive and attitudinal consequences of bilingual schooling: The St. Lambert project through grade five. *Journal of Educational Psychology*, *65*, 141–159.

Landry, R. G. (1972). The enhancement of figural creativity through second language learning at the elementary school level. *Foreign Language Annals*, *4*, 111–115.

Landry, R. G. (1973). The relationship of second language learning and verbal creativity. *Modern Language Journal, 57*, 110–113.

Lemmon, C. R., & Goggin, J. P. (1989). The measurement of bilingualism and its relationship to cognitive ability. *Applied Psycholinguistics, 10,* 133–155.

Levin, S. G., & Stephan, P. E. (1999, August 20). Are the foreign born a source of strength for U.S. science? *Science*, *285*, 1213–1214.

López, E. C., Esquivel, G. B., & Houtz, J. C. (1993). The creative skills of culturally and linguistically diverse gifted students. *Creativity Research Journal*, *6*, 401–412.

Maslow, A. H. (1959). Creativity in self-actualizating people. In H. H. Anderson (Ed.), *Creativity and its cultivation* (pp. 83–95). New York: Harper & Row.

McCrae, R. R. (1987). Creativity, divergent thinking, and openness to experience. *Journal of Personality and Social Psychology*, *52*, 1258–1265.

McNemar, Q. (1964). Lost: Our intelligence? Why? *American Psychologist*, *19*, 871–882.

Mednick, S. A. (1962). The associative basis of the creative process. *Psychological Review*, *69*, 220–232.

Michael, W. B., & Wright, C. R. (1989). Psychometric issues in the assessment of creativity. In J. A. Glover, R. R. Ronning, & C. R. Reynolds (Eds.), *Handbook of creativity* (pp. 33–52). New York: Plenum Press.

Mohanty, A. K., & Babu, N. (1982). Bilingualism and metalinguistic ability among Kond tribals in Orissa, India. *Journal of Social Psychology, 121*, 15–22.

Moulin, L. (1955). The Nobel Prizes for the sciences from 1901–1950: An essay in sociological analysis. *British Journal of Sociology*, *6*, 246–263.

Naroll, R., Benjamin, E. C., Fohl, F. K., Fried, M. J., Hildreth, R. E., & Schaefer, J. M. (1971). Creativity: A cross-historical pilot survey. *Journal of Cross-Cultural Psychology*, *2*, 181–188.

Okoh, N. (1980). Bilingualism and divergent thinking among Nigerian and Welsh school children. *Journal of Social Psychology, 110*, 163–170.

Park, R. E. (1928). Human migration and the marginal man. *American Journal of Sociology*, *33*, 881–893.

Peal, E., & Lambert, W. E. (1962). The relation of bilingualism to intelligence. *Psychological Monographs, 76*(27, Whole No. 546), 23.

Price-Williams, D. R., & Ramirez, M. (1977). Divergent thinking, cultural differences, and bilingualism. *Journal of Social Psychology, 103*, 3–11.

Raskin, E. A. (1936). Comparison of scientific and literary ability: A biographical study of eminent scientists and men of letters of the nineteenth century. *Journal of Abnormal and Social Psychology*, *31*, 20–35.

Ricciardelli, L. A. (1992). Creativity and bilingualism. *Journal of Creative Behavior, 26*, 242–254.

Richards, R., Kinney, D. K., Lunde, I., Benet, M., & Merzel, A. P. C. (1988). Assessing everyday creativity: Characteristics of the Lifetime Creativity Scales and validation with three large samples. *Journal of Personality and Social Psychology*, *54*, 476–485.

Roe, A. (1953). *The making of a scientist*. New York: Dodd, Mead.

Runco, M. A., & Charles, R. E. (1997). Developmental trends in creative potential and creative performance. In M. A. Runco (Ed.), *The creativity research handbook* (Vol. 1, pp. 115–152). Cresskill, NJ: Hampton Press.

Schaefer, J. M., Babu, M. C., & Rao, N. S. (1977). Sociopolitical causes of creativity in India 500 B.C.–1800 A.D.: A regional time-lagged study. Paper presented at the meeting of the International Studies Association, St. Louis, MO.

Simonton, D. K. (1975). Sociocultural context of individual creativity: A transhistorical time-series analysis. *Journal of Personality and Social Psychology*, *32*, 1119–1133.

Simonton, D. K. (1976). Philosophical eminence, beliefs, and zeitgeist: An individual-generational analysis. *Journal of Personality and Social Psychology*, *34*, 630–640.

Simonton, D. K. (1988). Galtonian genius, Kroeberian configurations, and emulation: A generational time-series analysis of Chinese civilization. *Journal of Personality and Social Psychology*, *55*, 230–238.

Simonton, D. K. (1997). Foreign influence and national achievement: The impact of open milieus on Japanese civilization. *Journal of Personality and Social Psychology, 72*, 86–94.

Simonton, D. K. (1999a). *Origins of genius: Darwinian perspectives on creativity*. New York: Oxford University Press.

Simonton, D. K. (1999b). Significant samples: The psychological study of eminent individuals. *Psychological Methods*, *4*, 425–451.

Simonton, D. K. (2000). Creativity: Cognitive, developmental, personal, and social aspects. *American Psychologist*, *55*, 151–158.

Simonton, D. K. (2003a). Creative cultures, nations, and civilizations: Strategies and results. In P. B. Paulus & B. A. Nijstad (Eds.), *Group creativity: Innovation through collaboration* (pp. 304–328). New York: Oxford University Press.

Simonton, D. K. (2003b). Creativity assessment. In R. Fernández-Ballesteros (Ed.), *Encyclopedia of psychological assessment* (Vol. 1, pp. 276–280). London: Sage Publications.

Simonton, D. K. (2004). *Creativity in science: Chance, logic, genius, and zeitgeist*. Cambridge, England: Cambridge University Press.

Sorokin, P. A. (1969). *Society, culture, and personality*. New York: Cooper Square. (Original work published 1947.)

Sorokin, P. A., & Merton, R. K. (1935). The course of Arabian intellectual development, 700–1300 A.D. *Isis*, *22*, 516–524.

Ting, S.-S. (1986). *The social psychology of Chinese literary creativity: An archival data analysis*. Unpublished doctoral dissertation, University of California, Davis.

Torrance, E. P. (1988). The nature of creativity as manifest in its testing. In R. Sternberg (Ed.), *The nature of creativity: Contemporary psychological perspectives* (pp. 43–75). New York: Cambridge University Press.

Torrance, E. P., Gowan, J. C., Wu, J., & Aliotti, N. C. (1970). Creative functioning of monolingual and bilingual children in Singapore. *Journal of Educational Psychology, 61*, 72–75.

Toynbee, A. J. (1946). *A study of history* (abridged by D. C. Somervell, Vols. 1–2). New York: Oxford University Press.

Veblen, T. (1919). The intellectual preeminence of Jews in modern Europe. *Political Science Quarterly*, *34*, 33–42.

Visher, S. S. (1947, Autumn). Starred scientists: A study of their ages. *American Scientist*, *35*, 543, 570, 572, 574, 576, 578, 580.

White, R. K. (1931). The versatility of genius. *Journal of Social Psychology*, *2*, 460–489.

Zuckerman, H. (1977). *Scientific elite*. New York: Free Press.

Chapter 8

Bilingualism and Language Cognitive Development

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Child: *Mon ventre est presque full de water!*
"My belly is almost" full "of" water!

My daughter, a French-English bilingual, said the above sentence when she was five years old. To someone familiar only with monolingual conversations, this sentence might sound as if she were arbitrarily using words from her two languages, making a kind of language salad. When parents of bilingual children hear mixed-language sentences, they sometimes worry that learning two languages confuses their children. Does bilingualism confuse children?

One of the earliest studies of a bilingual child's language development showed that bilingualism did not confuse the child. Ronjat (1913) kept a diary of the words and sentences used by his son, Louis, who was being raised speaking both French and German. Ronjat himself spoke only French to Louis while Louis's mother spoke only German. By the time Louis was 16 months old, he chose the appropriate language for his parents, saying *brot* (*bread* in German) to his mother and *pain* (*bread* in French) to his father. At the age of 28 months, Louis addressed the French cook in German, but he quickly learned to use the correct language. Louis learned German faster than he did French and, until he was about 43 months of age, he occasionally borrowed a German word when he was trying to speak French. Almost all of his language mixes could be attributed to a gap in Louis's French vocabulary. Ronjat attributed Louis's lack of confusion to the fact that both he and his wife always addressed Louis in their native tongue and did not themselves mix languages. He concluded that bilingualism did not have to lead to confusion.

This conclusion was questioned by the results of another diary study of a German-English bilingual child who grew up in the United States. Leopold (1949) spoke only German to his daughter, Hildegard, and his wife spoke only English. Hildegard produced mixed-language utterances. Leopold concluded that Hildegard passed through a stage of assuming that German and English were a single linguistic system. Hildegard did not differentiate her two languages until she was about three years of age.

On the basis of these two diary studies, it is impossible to draw any general conclusions about whether bilingualism confuses children. Not only do we have the results for only two children, but also there is a methodological difficulty with diary studies. In both cases, the diarist could only observe his child's behavior when he was present. The presence of one parent could affect the behavior of the child (Genesee, 1989). For example, in Hildegard Leopold's case, it is possible that she spoke as much German as possible when her father was present and never spoke it when he was absent. A diary study cannot tell us about behavior when the diarist is absent.

More recent research has corrected for this possibility by videotaping children in spontaneous conversation with a variety of people who speak different languages (Genesee, Nicoladis, & Paradis, 1995). For example, in a study of a Portuguese-English bilingual child growing up in the United States, the researchers videotaped the child playing in his home in two different contexts: (a) with the Portuguese-speaking father, videotaped by a native Portuguese speaker, and (b) with the English-speaking mother, videotaped by a native English speaker (Nicoladis & Secco, 2000). Results of studies like these show that bilingual children can reliably choose the language preferred by their interlocutor from at least two years of age (e.g., Nicoladis & Genesee, 1996).

In fact, by the age of two years, bilingual children even show sensitivity to a stranger's language choice. Genesee, Boivin, and Nicoladis (1996) observed four French-English bilingual two-year-olds growing up in Canada. All four children were learning French from one parent and English from another, although all the parents had some knowledge of the other language. The researchers first videotaped each child interacting with each of her parents in spontaneous play situations. Then, on the basis of parental reports and each child's production on the videotape, the researchers identified each child's weaker language (for two children it was French, and for the other two it was English). The researchers then asked a stranger who spoke only the child's weaker utterance to play with the child while being videotaped. Three of the four children spoke significantly more of the stranger's language with the stranger than with the relevant parent. These results suggest that the bilingual children were sensitive to the stranger's monolingualism and used as much of that language as they could.

Young bilingual children might also be sensitive to how their parents respond to their language mixing. Lanza (1992) observed a Norwegian-English bilingual girl, Siri, growing up in Norway with her Norwegian-speaking father and English-speaking mother. The father seemed to be more accepting of the child's language mixing; when Siri mixed languages, the father allowed the conversation to continue. For example, when Siri used the English word *hug* with him, he responded mostly in Norwegian, including the English word *hug*. In contrast, Siri's mother responded to mixed languages as if she did not understand the Norwegian words. Lanza argued that Siri was more likely to mix languages with her father because she learned that he accepted either language.

Taken together, these studies suggest that bilingualism does not confuse children. The language mixing that Leopold thought was evidence for confusion is actually a clever use of linguistic resources on the part of bilingual children. Bilingual children can clearly differentiate their languages from at least two years of age and can negotiate the appropriate language of a conversation. While bilingual children can differentiate their languages, they do not use their languages exactly

like two monolinguals (Grosjean, 2001). Why does bilingualism affect language and cognitive development? Clearly, the answer is at least somewhat implicit in the question—bilingual children know two languages and monolinguals know one. What is it about the knowledge of two languages that makes development different? In this chapter, I will discuss four ways in which researchers have documented differences between bilinguals and monolinguals: delay in language development, acceleration in language development, cross-linguistic transfer, and cognitive differences. At the outset, I would like to note that the differences between bilinguals and monolinguals are often small (see de Houwer, 2005). Nevertheless, the detectable differences can shed some light on how language and cognitive development unfold in all children.

Before turning to a review of the observed differences, it is important to note how bilingualism is characterized. I will concentrate on bilingual development in the first five years of life. Most of the studies have concerned simultaneous bilinguals (that is, children acquiring two languages from birth). Because it is possible that there will be differences in development if two languages are acquired sequentially (de Houwer, 1995), I will note if a study concerns sequential bilingual development. I will also concentrate on children who have been exposed to two languages on a regular basis. This characterization of bilingualism allows for the possibility of passive knowledge of one language. Because I am using such a liberal characterization of bilingualism, it is important to note, where possible, how variations in children's proficiency or degree of knowledge of the two languages affect our conclusions about where and why there are differences in development due to bilingualism.

Delay in Language Development

Does bilingualism delay language development? To answer this question reliably, it is important to compare a group of typically developing bilingual children with a group of typically developing monolingual children. However, it is difficult to find an appropriate group of bilinguals because bilinguals form a heterogeneous group. The heterogeneity comes from a variety of sources. Bilingual children are often more proficient in one language than another, with their proficiency varying considerably between individuals and over time. For example, Leopold (1949) reported that his daughter's German was weaker than her English until they went on a trip to Germany for several weeks. Variations in bilingual development might also be manifested in terms of the language pairs known (e.g., Chinese and English vs. Vietnamese and French). The attitudes toward bilingualism that parents and people in the general public have could also influence how well children end up speaking their two languages.

The heterogeneity of bilinguals is a challenge to devising norms for bilingual development. Nevertheless, researchers have been interested in what domains of language bilingualism might slow down. Before turning to the research results, I would like to caution the reader that few bilingual children have been studied in each of the domains I will mention.

In some domains of language development, bilingual children seem to show no delays. One of the earliest developmental markers of language behavior is the onset of canonical babbling, or babbling composed of consonant-vowel-consonant-vowel forms such as *dada*. Some researchers have argued that canonical babbling allows children to practice word-like forms before actually saying words (Vihman, 1996). One study recorded the babbling produced by infants who heard both Spanish and English on a regular basis (Oller, Eilers, Urbano, & Cobo-Lewis, 1997). This study showed that the age at which the bilingual infants started to use canonical babbling was the same age as has been reported for monolingual infants.

There is evidence of delays in language acquisition in other domains. I will mention two here: vocabulary size and production of past tense verbs.

Several researchers have reported that preschool bilingual children's vocabulary scores are often lower than monolingual children in either language (e.g., Pearson, Fernández, & Oller, 1993). Pearson et al. (1993) asked the parents of 25 Spanish-English bilingual children between 8 and 30 months of age to fill out vocabulary checklists of words that their children used spontaneously. They found that the average vocabulary score was about half that of a monolingual in each language (Pearson et al., 1993). However the total vocabulary size of bilingual children was approximately equivalent to the vocabulary scores reported by parents of monolingual children. In a follow-up study, the researchers compared the ratio of vocabulary between the two languages of an individual child with the time the parents reported that the child spent interacting in each language (Pearson, Fernández, Lewedag, & Oller, 1997). They found that the more time the children spent interacting in a language, the greater their vocabulary in that language. These results suggest that there may be some limits on children's vocabulary size in the first few years of life and that the frequency of exposure to a language will be related to which words a child learns.

It is possible that the limits on vocabulary size are limited to the first few years of life. Adult bilinguals can score as high as monolinguals on vocabulary tests in both languages (Eilers, Pearson, & Cobo-Lewis, under review). While no systematic analyses have addressed this issue with older children, there is some evidence pointing to the possibility that three- and four-year-old bilinguals might score higher on average than half the vocabulary of monolinguals (see Nicoladis, 2003). It is possible, then, that the delay in vocabulary acquisition in bilinguals in a language is a short-lived phenomenon, restricted to the first few years of language acquisition. I will return to this point later, when I talk about cognitive differences between bilinguals and monolinguals.

Another example of delay in language acquisition to be discussed here is in the acquisition of past tense verbs. One study reported such a delay in French-English bilingual children between the ages of 4 and 6 years (Nicoladis, Palmer, & Marentette, 2007). The researchers showed a cartoon to a group of bilingual children, a group of English monolingual children, and a group of French monolingual children. They asked the children to tell the story back to someone who had not seen the cartoon. The bilingual children told the story twice, once to a French speaker and once to an English speaker. The researchers found that the bilingual children used fewer correct past tense forms to tell a story than monolinguals in both languages. The differences were particularly noticeable with irregular past tense forms; the bilingual children made more errors by adding *–ed* to irregular verbs, like *goed* or *runned*. Because irregular past tense verbs are irregular, there is no way to learn them except by hearing them repeatedly (e.g., Bybee, 1995). Monolinguals also make the same kinds of errors, but they do so earlier in development. Thus, the researchers concluded that the bilingualism delayed the children's acquisition of past tense verbs. This delay could be due to the fact that they hear less of each language than monolinguals and practice using verbs less often as well.

In sum, I have mentioned here two domains in which delay in language acquisition has been observed in bilingual children: vocabulary size and past-tense verb forms (particularly irregulars). In these domains, the frequency of exposure to and use of a particular language is thought to play a crucial role in acquisition.

While delays might be attributed to frequency, it does not necessarily follow that no delay means that frequency is not an important variable in the acquisition of that particular aspect of language. The domains in which no delay has been reported are domains in which exposure to *any* language may be crucial. For example, as long as a child is hearing language on a regular basis, he/she will produce his/her first word around 13 months of age (e.g., Doyle, Champagne, &

Segalowitz, 1978; see Capute et al., 1986, for monolingual norms). There is no reason to suspect that bilingual children will be delayed in all domains of language development.

Acceleration in Language Development

I know of only one report of bilingualism being associated with acceleration in language development. Note that the fact that acceleration has been mentioned in the literature less often than delay cannot, at this point, necessarily be taken to mean that bilingualism delays development more often than it accelerates it. As mentioned in the last section, it is difficult to compare a few bilingual children's development with norms for monolinguals.

The report of accelerated development comes from a study in which children were asked to name some machines that were performing an action on an object (Nicoladis, 2003). For example, one machine was catching butterflies. In English, the children were encouraged to produce compound words like *butterfly catcher* (object-verb-*er*) and in French, *chasse-papillons*, (literal translation: *chase-butterflies*). Compounds of the form verb-object are grammatical in French (e.g., *casse-noisettes* or *break-hazelnuts* refers to a *nutcracker*), although there are few examples of them in the language. The preschool French-English bilingual children produced more compound words in French than monolingual children, once the vocabulary scores were statistically controlled for. How could the bilingual children's knowledge of English help them produce more verb-object compounds in French? To understand these results, it is important to know that monolingual English-speaking children produce ungrammatical verb-object compounds around the age of four years when an object-verb-*er* compound would be expected (Clark, Hecht, & Mulford, 1986). For example, they might say *a wash-bottle* to refer to someone who washes bottles, while adults are more likely to say *a bottle washer*. Nicoladis argued that the French-English bilingual children produced more verb-object compounds in French than monolinguals because they had access to verb-object compounds in English as well (for whatever reason monolingual English-speaking children use them).

Bilingual children may use whatever knowledge they have, even if it comes from the inappropriate language for the context. Gawlitzek-Maiwald and Tracy (1996) explored this issue using data from a German-English bilingual girl whose German was more proficient than her English. They recorded the child in spontaneous conversation with a variety of speakers. They showed that soon after the child started using auxiliary verbs in German, she also started to use these German auxiliary verbs in her otherwise mostly English utterances. For example, she said *ich hab gemade you much better* (*I have ge-made you much better*). Note that the morpheme *ge*–in German can mark a verb as being in the past tense. By using auxiliary verbs in German, this girl could clearly refer to events in the past in English, at a point in time when she could not do so in English alone. The researchers argued that the child's use of two languages allowed her to create utterances of a greater complexity than her English knowledge alone would allow her to do. They refer to this phenomenon as bilingual bootstrapping.

If the interpretation of these studies is correct, then knowledge of the underlying structure in one language (even if it is ungrammatical, as with the verb-object compounds) can bootstrap bilingual children into producing a similar structure in their other language. This production can happen earlier than one might expect, given the children's proficiency. If the two languages share a structure, then bilingual children might be more advanced in development than monolingual children at a similar stage of linguistic development. What happens when two languages differ in structure?

Cross-Linguistic Transfer

Bilingual children sometimes use constructions in one language that seem to be based on a structure from the other language. For example, a Spanish-English bilingual child might talk about *the shoe of my father*, rather than the more usual *my father's shoe*, based on the Spanish construction *el zapato de mi papá*. I use the terms cross-linguistic transfer (or transfer) to refer to the structural influence of one language on another. The resulting construction in the previous example is grammatical in English, although the result of cross-linguistic transfer could be an ungrammatical construction. For example, one Italian-German bilingual child growing up in Italy said *Von Lisa klein klein* (*from Lisa little little;* Volterra & Taeschner, 1978). Most adjectives in Italian typically appear after nouns while adjectives in German typically appear before nouns. The child may have been using the Italian word order in German. Another example comes from a Cantonese-English bilingual child who said *Where's the Santa Claus give me the gun*?" meaning to refer to the gun that Santa Claus had given him (Yip & Matthews, 2000). The researchers argue that the child was using a word order allowed in Cantonese.

Cross-linguistic transfer has not just been observed in word order. For example, Holm and Dodd (1999) described the pronunciation of particular consonants in Cantonese by two children who started learning English after their second year. Both children were living in Australia and were the children of immigrants from Hong Kong. The researchers made regular recordings of the children's pronunciation of words in conversation for about six months. The children initially pronounced their Chinese words with Chinese sounds. After a few months of exposure to English, however, they started to use some English-sounding consonants in their pronunciation of Cantonese words.

Researchers have been exploring several explanations of cross-linguistic transfer. I will briefly mention two here: (a) idiosyncratic input, and (b) speech production. Note that these explanations are not necessarily mutually exclusive. It is possible that transfer is a complex phenomenon with many sources.

Idiosyncratic input could account for some cases of cross-linguistic transfer. In one study, researchers focused on the spontaneous productions of a Spanish-English bilingual child who was growing up in Great Britain (Paradis & Navarro, 2003). In Spanish, it is possible to produce a grammatical sentence without specifically mentioning the subject of the sentence. For example, it is possible to say *Yo como la manzana* (literal translation: *I eat the apple*) and *Como la manzana* (literal translation: *eat the apple*). The researchers were interested if the bilingual child would produce more subjects of sentences in her Spanish sentences because they are required to make grammatical sentences in English. They found that the child did, in fact, produce more subjects in Spanish than two monolingual Spanish-speaking children of the same age. Before concluding that the child's idiosyncratic Spanish was due to knowledge of English, the researchers calculated how often the parents produced subjects of sentences. They discovered that both parents of the bilingual child also produced more subjects than did the mothers of the monolingual children. The researchers could not rule out the possibility that the child was learning an idiosyncratic version of Spanish (at least initially).

Another possible explanation of cross-linguistic transfer is that it appears in the normal process of putting words to ideas in the act of producing speech (Nicoladis, 2006). Nicoladis came to this explanation on the basis of data from French-English bilingual children. She showed preschool children pictures of objects and encouraged them to label the objects with adjective-noun constructions (like *a sad dog* or *a striped dinosaur*). The bilingual children did two sessions, one in English with a native English speaker and one in French (on a different day) with a native French

speaker. In English, adjectives almost always appear before nouns and in French, most adjectives appear after nouns (e.g., *carte blanche*: Literal translation, *card white*) although some adjectives appear before nouns (like *grand*: Translation, *big* and *nouveau*: Translation, *new*). Before discussing the results that pointed to evidence for cross-linguistic transfer, it is important to note that most of what the bilingual children said was grammatical for the target language. The bilingual children reversed more adjectives in English (e.g., *a dog sad*) than monolingual children. The bilingual children also reversed more adjectives in French than monolingual children (e.g., *un rayé elephant*: Translation, *a striped elephant*; this adjective would typically appear after the noun). Finally, the bilingual children reversed more adjectives in French than in English.

Nicoladis (2006) argued that the cross-linguistic transfer observed the previous study and in other studies of bilingual children comes from how speakers put words to the concepts they wish to convey. Previous studies of monolinguals have shown that speech errors are likely to occur when speakers have to choose between two linguistic structures conveying the same message (Ferreira & Dell, 2000). For example, a person who uses both the words *sofa* and *Chesterfield* might occasionally say *chofa*. Nicoladis (2006) argued that cross-linguistic transfer can be seen as a kind of speech error. Any time bilinguals have to choose between linguistic structures (either within a language or between languages), they are more likely to make speech errors. According to this interpretation, the reason bilingual children make more errors in French than in English with adjective placement is because there are two options of where to place adjectives in French.

In sum, while much of what bilingual children say is grammatical in the target language, it is clear that they produce some constructions that are influenced by knowledge of their other language. Several factors might contribute to children's likelihood to display cross-linguistic transfer, including idiosyncratic input (for other possible factors, see Müller & Hulk, 2001). It is also possible that cross-linguistic transfer is due, at least in part, to children having to choose between a variety of different ways of conveying a message. If this is true, then, the cross-linguistic transfer observed in bilingual children may not be all that different from the kinds of speech errors observed in monolingual children.

Cognitive Differences

Several researchers have argued that bilingual children's cognitive development would benefit from knowing two languages and having a contrast in two linguistic systems. The contrast would facilitate bilingual children's insight into the separability of words from their referents. Since the 1960s and 1970s, researchers have documented cognitive differences between bilinguals and monolinguals, with a bilingual advantage in cognitive flexibility (e.g., Ben-Zeev, 1977), intelligence and creativity (Peal & Lambert, 1962). These researchers argued that experience with choosing languages permitted bilinguals to create less strong connections between words and referents. More recently, researchers have narrowed in on a few ways in which bilinguals think differently from monolinguals. In this section, I will discuss four ways: communicative competence, theory of mind, strategy use, and control of attention.

Communicative competence refers to the ability to communicate effectively, taking into account the interlocutor's knowledge and conversational needs. Bilingual children have extensive experience of choosing languages for the pragmatic context, such as a particular person or a topic. As a result of their experience choosing different languages, they might become sensitive to other people's communicative needs. For example, consider the results of one study with two-year-old French-English bilingual children growing up in Montreal (Comeau, Genesee, & Lapaquette,

2003). In this study, the researchers visited the children three times and on each visit calibrated the rate of language mixing that they used in speaking to the children. On the first visit, the rate of mixing was low, on the second visit it was higher and on the third visit it was low again. The children's rate of language mixing mirrored that of the researchers. This result suggests that bilingual children can modify their rate of mixing to correspond to that of their interlocutor. Another example of communicative competence comes from a study of two Estonian-English bilingual siblings who were raised in the United States (Vihman, 1998). They were recorded in free play situations over the course of about four years, starting when the older sister was almost six and the younger brother was about two-and-a-half years old. Vihman noticed that the children used English (the language of school and outside the home) for dramatic play and Estonian (the language of the home and the children's stronger language) to negotiate the rules of play. Thus, the children seemed to associate each language with a function.

The results of the previous studies suggest that bilingual children can make on-line adjustments of their language choice, depending on what language is spoken to them. Are they simply reacting to the language spoken to them at that moment? Or do they know something about how much linguistic knowledge they share with their interlocutor? One way to assess the source of bilingual children's communicative competence is to see if children are sensitive to an interlocutor's linguistic knowledge and see how they behave with languages they do not speak. The results of one study could suggest that bilinguals might be more sensitive than monolinguals to an interlocutor's knowledge when the interlocutor speaks a language that the children do not. Nicoladis, Kwong See, and Rhemtulla (2005) compared English monolinguals and French-English bilinguals on whether or not they understood that they did not understand what a Chinese speaker meant. The study was based on research showing that children tend to assume that novel words refer to objects for which they do not know a name (e.g., Markman, Wasow, & Hansen, 2003). Nicoladis and her colleagues asked two- and three-year-old children to indicate whether a novel word that was used by a speaker who only spoke in Chinese referred to an object for which they already knew a name (like an *apple*) or an unfamiliar object (like a *Zimmer frame*). If children understood that Chinese words could refer to objects for which they already had a name in English, they should pick randomly between familiar and unfamiliar objects. In fact, this is what the bilingual children did. In contrast, the monolingual children were less likely to pick familiar objects, suggesting that they treated Chinese words much like novel English words. Other studies with older bilingual children have not necessarily shown the same pattern of results (e.g., Davidson, Jergovic, Inami, & Theodos, 1997). However, Nicoladis et al. (2005) pointed out that the interlocutors sometimes switched languages in that study, so the bilingual children could have been allowing the possibility of a language switch. The results of the study with younger children suggest that bilingual children may be sensitive to their interlocutor's linguistic knowledge.

To see to what extent bilingualism leads to sensitivity to other people's knowledge, researchers have tested the hypothesis that bilingual children have an advantage over monolinguals in the development of theory of mind. Theory of mind refers to the ability to think about others' thoughts, especially the ability to know that others can have different thoughts from oneself (Bartsch & Wellman, 1995). Because bilingual children have the experience of changing languages according to the interlocutor, they might develop an early understanding that other people's thoughts can differ from their own. One task used to assess children's theory of mind is a false belief task (Perner, Leekam, & Wimmer, 1987). For example, children might be shown a Smarties box and asked what is inside. They usually say that there are Smarties inside. The researcher then opens up the box to reveal something else, like pencils. The children are then asked to predict what another person who was not present for the opening of the Smarties box will say is in the box. Three-year-old

children often say *pencils* while four-year-old children are more likely to say *Smarties* (Perner et al., 1987). Researchers have interpreted these findings to mean that three-year-old children assume that everyone shares the same knowledge as they themselves have while four-year-olds are capable of considering the possibility that someone could have different beliefs and that these beliefs could be false. Goetz (2003) showed that Mandarin-English bilingual children were more likely to pass a false belief task than English monolingual children. It should be noted that other studies have shown no bilingual advantage in theory of mind tasks (e.g., Jean-Louis, 1999) or an advantage only after vocabulary had been controlled (e.g., Bialystok & Senman, 2004). Nevertheless, the bulk of the results point to the possibility that bilingualism leads to increased sensitivity to the knowledge of other people.

Another area of cognitive development that bilingualism might affect is the use of implicit strategies in communicating. Previous research with bilingual adults has shown that bilinguals learn words after fewer exposures that monolinguals (Gollan & Silverberg, 2001). Recall the point that was raised earlier in this chapter that preschool bilingual children sometimes have lower vocabularies than monolinguals in any one language (e.g., Pearson et al., 1993). At what point in development do strategies for rapid word learning develop? A possible partial answer to this question has emerged in a study of four- to six-year-old bilinguals (Nicoladis, Pika & Marentette, 2005). This study showed that when French-English bilingual children watched a Pink Panther cartoon and told back the story, they used more manual gestures while speaking than either English or French monolingual children (who used gestures at about the same rate). The researchers interpreted this result as suggesting that bilinguals gesture more to help access their words more efficiently. In fact, they found that the bilinguals used just as many words to tell their stories as monolinguals in both languages. This result is surprising if bilingual children's vocabulary size is smaller in either language than that of monolingual children.

Why might gesturing help children access words? Previous studies have shown that both adults' (e.g., Frick-Horbury & Guttentag, 1998) and children's (e.g, Alibali, Kita, & Young, 2000) use of gestures aided in accessing spoken language, particularly when people were asked to do a difficult task. It is therefore plausible that bilinguals use gestures to help access their spoken language efficiently. There are two other pieces of evidence converging on that same conclusion. First, bilingual children younger than four years of age have been shown to use some kinds of gestures when uttering particularly long utterances (Nicoladis, Mayberry, & Genesee, 1999; Nicoladis, 2002). Second, bilingual adults also gesture more than monolinguals, even when speaking their first language (Pika, Nicoladis, & Marentette, 2006). Taken together, these results suggest that bilinguals generally use manual gestures more than monolinguals, starting in the preschool years. The results to date are compatible with the idea that bilinguals use gestures more in order to aid their own access of spoken language. Bilinguals might use gestures to help reduce the competition between the two languages when they produce speech.

One possible outcome of bilingual children's experience with choosing the appropriate language for a particular person or context is enhanced selective attention to the relevant variables, particularly for formal linguistic tasks (Bialystok, 2001). For example, Bialystok (2001) reviewed a number of studies showing that bilingual children can perform better on grammaticality judgments of sentences that are also semantically anomalous (e.g., *Colourless green ideas sleep furiously*). In order to judge a semantically anomalous sentence as grammatical or ungrammatical, it is necessary to attend selectively to the syntax and ignore the meaning. These results have been replicated by other researchers (e.g., Cromdal, 1999). It is not clear that the bilingual advantage extends to all aspects of formal linguistic knowledge at all ages (e.g., Bialystok, Majumder, & Martin, 2003).

Nevertheless, the experience of choosing the appropriate language(s) for the context may give bilinguals some cognitive benefits over monolinguals.

In sum, bilingual children may have some differences from monolinguals in cognitive development in terms of communicative competence, theory of mind, gesture use and selective attention. In this section, I have addressed these four components of cognition as if they were separate. It is clearly possible that all four are manifestations of a single underlying cognitive process. Alternatively, it is quite likely that all four are minimally interrelated. For example, it could be the experience of choosing languages for a context that allows the bilingual advantages in taking other people's perspective (thus, enhanced theory of mind). This enhanced theory of mind might allow children's control of attention to relevant formal linguistic properties. It would be interesting to know how these aspects of cognitive development are related in both bilinguals and monolinguals.

Summary and Conclusion

The purpose of this chapter was to offer some answers to the question of why or how bilingualism affects language and cognitive development. As I noted at the beginning of the chapter, it is not surprising to find that the answer is at least partially definitional: bilingual children know two languages and monolinguals know one. What is it about the knowledge of two languages that makes development different? I reviewed four areas in which differences between bilinguals and monolinguals have been documented: delay in language development, acceleration in language development, cross-linguistic transfer, and cognitive differences. There are small but detectable differences between bilinguals and monolinguals in these areas. These differences can shed some light onto how language and cognitive development unfold in all children. I will review each of the major differences in turn, in hopes of highlighting what the differences might tell us about language and cognitive development in general.

There is some evidence of bilinguals acquiring some aspects of language more slowly than monolinguals. Recall, however, that bilinguals do not seem to be delayed in all aspects of language. The delays observed thus far are often with aspects of language that are thought to be highly dependent on frequency. And bilingual children hear and use less of either language than monolingual children. For example, bilingual children's delay in learning irregular past tense forms (Nicoladis et al., 2007) should come as no surprise. There is no other way to learn a truly irregular past tense except by memorization (e.g., Bybee, 1995). Bilinguals' less frequent experience with either language should cause delays in the aspects of language in which frequency is crucial for acquisition. Some language theorists have argued that much of language is learned on the basis of children's own usage (e.g., Tomasello, 2000). Bilingual acquisition allows an interesting testing ground for such theories.

Language acquisition is not based on frequency of usage alone. At some point in development, children must make generalizations about the patterns of linguistic combinations that can exist in their languages. In this chapter, I argued that when bilinguals have two similar underlying structures in their two languages, they can be accelerated in their usage of that structure relative to what we might expect from their level of proficiency (see Nicoladis, 2003). If bilinguals have two different underlying structures available, then there may be some cross-linguistic transfer, at least when they produce speech. If this interpretation is correct, then bilingual children's generalizations about possible structures in their two languages are not completely distinct by language (see discussion in Paradis & Genesee, 1996). If true, then children's generalizations about underlying

structures may go beyond what they have heard or used themselves. To some extent at least, children's underlying linguistic knowledge might not be linked to knowledge of a specific language.

Cross-linguistic transfer is due to different underlying structures in the children's two languages. Bilingual children must learn to process language-specific structures. When there are differences between the two languages' structures, children might have to choose between them. There are some interesting preliminary results that point to the possibility that bilingual children must discover strategies for effective speech production. For example, Nicoladis et al. (2005) showed that bilingual children gestured more than monolingual children when telling back a story. They interpreted these results to suggest that the bilingual children were using gestures to help access words and were doing so efficiently. To test this interpretation, it would be interesting to verify if gestures were more likely to occur when the underlying structures in the two languages were different. If so, then bilingual children might be using gestures to lighten the cognitive load of choosing between two languages (see Goldin-Meadow, 2000, for a discussion of some of the possible functions of gestures).

Lastly, bilingual children have shown slight advantages over monolingual children in terms of communicative competence, theory of mind, and selective attention. Researchers have argued that these advantages are due to bilingual children's experience with choosing appropriate language(s) for the context (e.g., Bialystok, 2001; Nicoladis et al., 2005). If this interpretation is correct, then children's early experience with language choice could lead them to early insight into the minds of others and attention to relevant cues, at least in linguistic and social domains. To test this interpretation, it would be particularly crucial to document changes in theory of mind and selective attention longitudinally as children acquire a second language in the preschool years.

In closing, it is clear that bilingualism does not lead to confusion in development, as once feared by researchers and parents alike. The literature I reviewed here showed that bilingualism does impact on both language and cognitive development in small and systematic ways. The differences between bilingualism and monolingualism allow us insights into how development unfolds. For example, we can uncover where experience using a language makes a difference in how that language develops (e.g., Tomasello, 2000). As further research with bilinguals is carried out, we will gain additional insights into how development takes place in all children.

List of Key Words and Concepts

Bilingual bootstrapping, Canonical babbling, Cognitive flexibility, Communicative competence, Control of attention, Cross-linguistic transfer, Diary Studies, False belief task, Idiosyncratic input, Theory of mind, Vocabulary size, Sequential bilingualism, Simultaneous bilinguals, Speech production, Strategy use

Internet Sites Related to Development and Bilingualism

Brain Connection: http://www.brainconnection.com/topics/?main=fa/cognitive-bilingualism4
Child Language Data Exchange System: http://childes.psy.cmu.edu/
Developmental Psychology: http://www.nichd.nih.gov/crmc/cdb/p_lang.htm
Language Literacy Lab: http://myweb.dal.ca/sdeacon/
National Institute of Child Health and Human Development: http://www.nichd.nih.gov/crmc/cdb/p_lang.htm

The Virtual Center for Language Acquisition: http://www.clal.cornell.edu/vcla/first_lang_mems.html

Discussion Questions

1. What is cognitive flexibility?
2. After reading this chapter, what is your opinion on child bilingualism? That is, if you had the opportunity, would you raise your child bilingual or monolingual?
3. What are some examples of cross-linguistic transfer?
4. Is there any evidence bilingualism negatively affects the development of language acquisition?
5. How do language developmental psychologists measure vocabulary size?

Suggested Research Projects

1. Amongst your classmates, find someone who knows a few words in a language other than the base language that most of your classmates speak. Have that person choose a set of 10–12 words and then attempt to teach that language to members of your class (different types of words can be obtained from the website: http://www.math.yorku.ca/SCS/Online/paivio/). First, the class should be divided into two groups. For one group, discuss the meanings of the to-be-acquired words, use them in a sentence, and have the members of the group create sentences in English where that new-language word would fit appropriately. You can call this group the *semantic group* because they will be creating sentences that require knowing the meaning of the word. For the other group, simply have each member of the group study the new word with its English translation, in a silent mode. You can call this group the *rote group* because this group will be trying to just memorize the words. A few days later, test each group on the words by providing an English sentence and a list of the newly-learned words and having them match the words to the appropriate sentences. This test should be a surprise, or what is called a test of "incidental" learning. So don't tell the students ahead of time that they will be tested. Which group performed best? What kinds of strategies did the student report having used when either studying the lists or trying to retrieve the information they had learned, from memory?
2. As a follow up project, take the very same set of words from the first project, and have each student in the class administer the same procedure to a child they know, with the parent's and child's permission. Remember, assign half of the class to the *semantic* group, as in the previous Group 1, and assign the rest of the students to the *rote* group, Group 2. Have all of the classmates share their data as a group, once the task has been completed. Try to work within a small age range for the children, or perhaps include children who share the same age. Be sure that all students administering the task wait the same amount of time before testing the children again. Also, the examples used for sentences and definitions should be created for the reading level of the children who will be involved in the study. What did you find?

Suggested Readings

Ben-Zeev, S. (1977). Mechanisms by which childhood bilingualism affects understanding of language and cognitive structures. In P. A. Hornby (Ed.), *Bilingualism: Psychological, social, and educational implications*. New York: Academic Press.

de Houwer, A. (1995). Bilingual language acquisition. In P. Fletcher & B. MacWhinney (Eds.), *The handbook of child language* (pp. 219–250). Oxford, UK: Blackwell.

Genesee, F. (1989). Early bilingual development: One language or two? *Journal of Child Language, 16*, 161–179.

References

Alibali, M. W., Kita, S., & Young, A. J. (2000). Gesture and the process of speech production: We think, therefore we gesture. *Language and Cognitive Processes, 15*, 569–613.

Bartsch, K., & Wellman, H. M. (1995). *Children talk about the mind*. New York: Oxford University Press.

Ben-Zeev, S. (1977). Mechanisms by which childhood bilingualism affects understanding of language and cognitive structures. In P. A. Hornby (Ed.), *Bilingualism: Psychological, social, and educational implications*. New York: Academic Press.

Bialystok, E. (2001). *Bilingualism in development: Language, literacy, and cognition*. New York: Cambridge University Press.

Bialystok, E., Majumder, S., & Martin, M. M. (2003). Developing phonological awareness: Is there a bilingual advantage? *Applied Psycholinguistics, 24*, 27–44.

Bialystok, E., & Senman, L. (2004). Executive processes in appearance–reality tasks: The role of inhibition of attention and symbolic representation. *Child Development, 75*, 562–579.

Bybee, J. (1995). Regular morphology and the lexicon. *Language and Cognitive Processes, 10*, 425–455.

Capute, A. J., Palmer, F. B., Shapiro, B. K., Wachtel, R. C., Schmidt, S., & Ross, A. (1986). Clinical linguistic and auditory milestone scale: Prediction of cognition in infancy. *Developmental Medicine and Child Neurology, 28*, 762–771.

Clark, E. V., Hecht, B. F., & Mulford, R. C. (1986). Coining complex compounds in English: Affixes and word order in acquisition. *Linguistics, 24*, 7–29.

Comeau, L., Genesee, F., & Lapaquette, L. (2003). The modeling hypothesis and child bilingual code-mixing. *International Journal of Bilingualism, 7*, 113–126.

Cromdal, J. (1999). Childhood bilingualism and metalinguistic skills: Analysis and control in young Swedish-English bilinguals. *Applied Psycholinguistics, 20*, 1–20.

Davidson, D., Jergovic, D., Inami, Z., & Theodos, V. (1997). Monolingual and bilingual children's use of the mutual exclusivity constraint. *Journal of Child Language, 24*, 3–24.

de Houwer, A. (1995). Bilingual language acquisition. In P. Fletcher & B. MacWhinney (Eds.), *The handbook of child language* (pp. 219–250). Oxford, UK: Blackwell.

de Houwer, A. (2005). Early bilingual acquisition: Focus on morphosyntax and the separate development hypothesis. In J. Kroll & A. De Groot (Eds.), *The handbook of bilingualism* (pp. 30–48). Oxford: Oxford University Press.

Doyle, A. B., Champagne, M., & Segalowitz, N. (1978). Some issues in the assessment of linguistic consequences of early bilingualism. In M. Paradis (Ed.), *Aspects of bilingualism* (pp. 13–20). Columbia, SC: Hornbeam Press.

Eilers, R. E., Pearson, B. Z., & Cobo-Lewis, A. B. (under review). *The social circumstances of childhood bilingualism: The Miami experience.*

Ferreira, V. S., & Dell, G. S. (2000). Effect of ambiguity and lexical availability on syntactic and lexical production. *Cognitive Psychology, 40*, 296–340.

Frick-Horbury, D., & Guttentag, R. E. (1998). The effects of restricting hand gesture production on lexical retrieval and free recall. *American Journal of Psychology, 1*, 43–62.

Gawlitzek-Maiwald, I., & Tracy, R. (1996). Bilingual bootstrapping. *Linguistics, 34*, 901–926.

Genesee, F. (1989). Early bilingual development: One language or two? *Journal of Child Language, 16*, 161–179.

Genesee, F., Boivin, I., & Nicoladis, E. (1996). Bilingual children talking with monolingual adults: A study of bilingual communicative competence. *Applied Psycholinguistics, 17*, 427–442.

Genesee, F., Nicoladis, E., & Paradis, J. (1995). Language differentiation in early bilingual development. *Journal of Child Language*, *22*, 611–631.

Goetz, P. J. (2003). The effects of bilingualism on theory of mind development. *Bilingualism: Language and Cognition, 6*, 1–15.

Goldin-Meadow, S. (2000). Beyond words: The importance of gestures to researchers and learners. *Child Development, 71*, 231–239.

Gollan, T. H., & Silverberg, N. B. (2001). Tip-of-the-tongue states in Hebrew-English bilinguals. *Bilingualism: Language and Cognition, 4*, 63–83.

Grosjean, F. (2001). The bilingual's language modes. In J. L. Nicol (Ed.), *One mind, two languages: Bilingual language processing* (pp. 1–22). Oxford: Blackwell.

Holm, A., & Dodd, B. (1999). A longitudinal study of the phonological development of two Cantonese-English bilingual children. *Applied Psycholinguistics, 20*, 349–376.

Jean-Louis, B. (1999). *Does childhood bilingualism facilitate the development of theory of mind?* Unpublished PhD dissertation, Yale University, New Haven, CT.

Lanza, E. (1992). Can bilingual two-year-olds code-switch? *Journal of Child Language, 19*, 633–658.

Leopold, W. (1949). *Speech development of a bilingual child* (Vol. 4). Evanston, IL: Northwestern University Press.

Markman, E. M., Wasow, J. L., & Hansen, M. B. (2003). Use of the mutual exclusivity assumption by young word learners. *Cognitive Psychology, 47*, 241–275.

Müller, N., & Hulk, A. (2001). Crosslinguistic influence in bilingual language acquisition: Italian and French as recipient languages. *Bilingualism: Language and Cognition, 4*, 1–21.

Nicoladis, E. (2002). Some gestures develop in conjunction with spoken language development and others don't: Evidence from bilingual preschoolers. *Journal of Nonverbal Behavior, 26*, 241–266.

Nicoladis, E. (2003). Cross-linguistic transfer in deverbal compounds of preschool bilingual children. *Bilingualism: Language and Cognition, 6*, 17–31.

Nicoladis, E. (2006). Cross-linguistic transfer in adjective-noun strings by preschool bilingual children. *Bilingualism: Language and Cognition*, *9*, 15–32.

Nicoladis, E., & Genesee, F. (1996). A longitudinal study of pragmatic differentiation in young bilingual children. *Language Learning, 46*, 439–464.

Nicoladis, E., Kwong See, S., & Rhemtulla, M. (2005). Are mutual exclusivity violations guided by children's assumptions about people's word knowledge? Paper presented at the Jean Piaget Society, Vancouver, BC, Canada.

Nicoladis, E., Mayberry, R., & Genesee, F. (1999). Gesture and early bilingual development. *Developmental Psychology, 35*, 514–526.

Nicoladis, E., Palmer, A., & Marentette, P. F. (2007). The role of type and token frequency in using past tense morphemes correctly. *Developmental Science, 10*, 237–254.

Nicoladis, E., Pika, S., & Marentette, P. F. (2005). *Gesturing bilingually: French-English bilingual children's gestures.* Paper presented at the International Congress for the Study of Child Language, Berlin, Germany.

Nicoladis, E., & Secco, G. (2000). The role of a child's productive vocabulary in the language choice of a bilingual family. *First Language, 58*, 3–28.

Oller, D. K., Eilers, R. E., Urbano, R., & Cobo-Lewis, A. B. (1997). Development of precursors to speech in infants exposed to two languages. *Journal of Child Language, 24*, 407–425.

Paradis, J., & Genesee, F. (1996). Syntactic acquisition in bilingual children: Autonomous or interdependent? *Studies in Second Language Acquisition, 18*, 1–25.

Paradis, J., & Navarro, S. (2003). Subject realization and crosslinguistic interference in the bilingual acquisition of Spanish and English: What is the role of the input? *Journal of Child Language, 30*, 371–393.

Peal, E., & Lambert, W. E. (1962). The relation of bilingualism to intelligence. *Psychological Monographs, 76*, 1–23.

Pearson, B. Z., Fernández, S. C., Lewedag, V. L., & Oller, D. K. (1997). The relation of input factors to lexical learning by bilingual infants (ages 10 to 30 months). *Applied Psycholinguistics, 18*, 41–58.

Pearson, B. Z., Fernández, S. C., & Oller, D. K. (1993). Lexical development in bilingual infants and toddlers: Comparison to monolingual norms. *Language Learning, 43*, 93–120.

Perner, J., Leekam, S. R., & Wimmer, H. (1987). Three-year-olds' difficulty with false belief: The case for a conceptual deficit. *British Journal of Developmental Psychology, 5*, 125–137.

Pika, S., Nicoladis, E., & Marentette, P. F. (2006). A cross-cultural study on the use of gestures: Evidence for cross-linguistic transfer? *Bilingualism: Language and Cognition, 9*, 319–327.

Ronjat, J. (1913). Le développement du langage chez un enfant bilingue. Paris: Champion.

Tomasello, M. (2000). First steps toward a usage-based theory of language acquisition. *Cognitive Linguistics, 11*, 61–82.

Vihman, M. M. (1996). *Phonological development*. Cambridge, MA: Blackwell Publishers.

Vihman, M. M. (1998). A developmental perspective on codeswitching: Conversations between a pair of bilingual siblings. *International Journal of Bilingualism, 2*, 45–84.

Volterra, V., & Taeschner, T. (1978). The acquisition and development of language by bilingual children. *Journal of Child Language, 5*, 311–326.

Yip, V., & Matthews, S. (2000). Syntactic transfer in a Cantonese-English bilingual child. *Bilingualism: Language and Cognition, 3*, 193–208.

IV

SOCIAL AND SOCIOCULTURAL PROCESSES

Chapter 9

Social Psychological Approaches to Bilingualism

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The Influence of Social Context on Bilingualism

When I was growing up, my younger brother had a difficult time rolling his Spanish *r's* He would say *fe-do-ca-dil* for *fer-ro-ca-ril* (*r* as in *rhinoceros* and *c* as in *cat*), which in English means *train*. English speakers can probably empathize with my brother, as the Spanish /r/ is also difficult to pronounce in the English language. In trying to be a good brother, I would design various phonetic exercises for my brother to practice ("say RRRRAAAA"), but the more I tried, the more self conscious he would be, and the less he would try. My brother's agony strikes at the heart of social psychology, which can be loosely defined as the influence people have on each other. If you have learned a second language as an adult, you know the role that others have played in your level of fluency and mastery. If others pressured you or made fun of you, it probably took you longer to learn that second language; likewise, if others were supportive, it probably took you less time.

Social psychology is the study of social influence (Myers, 2005), and its role on bilingualism centers on the attitudes and perceptions that individuals have about speaking two languages. Attitudes about bilingualism are translated into the actions, emotions, and thoughts of individuals. As a result, how well bilingualism is embraced or disdained is influenced by others' actual, implied, and imagined presence (Allport, 1954). Most of the other chapters in this book emphasize objective views about bilingualism. With social psychology, the focus is on the subjectivity of how the social context of bilingualism is perceived. Because learning a second language is a difficult, time

consuming enterprise (Germano, 2004, June 11), the process of becoming a bilingual depends on the social value that can be afforded to such an activity. Hamers and Blanc (2000) refer to this process as *valorization*, or how receptive the social context is toward bilingualism. In the United States, as well as many other societies, the social context for valorization of bilingualism has been low, or *devalorized*. This outcome is the result of historical influences, geographic location, and prevailing social values (Reid & Ng, 1999).

Examples of how the social context influences views about bilingualism can be seen in its definition. A person who speaks Spanish and English is labeled *bilingual*, but not the person who speaks English and knows American sign-language—with the persons in both cases knowing two alternative communication systems. Similarly, a person who knows English and can expertly write C+ computer language is not considered bilingual. A person who speaks Standard English and Ebonics, the English spoken by some African Americans and which is negatively viewed by the dominant society (Fields, 1997), is also not considered bilingual. Thus, the social context determines how bilingualism is viewed and defined because of the consensus that must exist on its definition.

One additional aspect to bilingualism is that it involves more than language as speech (Wade, 2003), and more than input-output, or the heard-spoken dimensions. Bilingualism is not just the ability to speak, write, and read in two languages (Germano, 2004, June 11), but also a socially based communication system. Social aspects involved in bilingualism include intonation, gestures, gazes, gesticulations, body movements, and even spatial placement (i.e., proxemics; Krauss & Chiu, 1998). These all imbue meaning into the context where communication takes place. Once the meaning of communication has achieved consensus, it becomes prescriptive and normative, which typically greases social interaction into a smooth communication exchange, with deviations to rules heavily punished (Myers, 2005). The easiest way to understand these norms and behavioral prescriptions is to think of a job interview. If the interviewee shows up at the interview disheveled, sits laggardly on the chair, refers to the interviewer as "dude," and occasionally burps, the job offer is unlikely to be made. Thus, we must conform to social conventions—norms—or suffer the consequences.

Thus, communication becomes socially driven because of the many rules that must be followed for smooth understanding. These rules can be seen operating in English monolingual groups, where a preference for Standard English is valued and carries a higher status. Likewise, for groups who are bilingual, where to the extent that it is a common practice, combining of the two languages is accepted, expected, and rule driven—a process known as code-switching (see Heredia, this volume). These rules even apply when bilinguals combine the two languages to create a new dialect, such as the *Spanglish* expression of *llamar para atrás* (*to call back*) which follows the English literal meaning, but not the Spanish meaning of *devolver la llamada* or *return the call* in English (e.g., Anzaldua, 1987).

As can be seen, objective criteria through competency and fluency in two languages can define the bilingual person; however, it is through subjective criteria that bilingualism is viewed in a social psychological context, both in terms of social validation, status, and perceptions. The rest of the chapter will cover social psychological approaches to bilingualism. Specifically, we will examine the roles played on bilingualism by social identity, culture, attitudes, stereotypes, norms, and the social context of interactive groups.

Bilingualism and Social Identity: A Reciprocal Relationship

According to Tajfel (1981), social identity theory posits that people form a close identity bond with their group (known as the in-group), give them preferential treatment, and emphasize similarities.

In contrast, people distance themselves from an external group (known as the out-group), discriminate against them, and emphasize differences. As such, language becomes a marker of social identity, and to the extent that bilingualism is part of the in-group identity, it will be embraced. By the same token, if bilingualism is part of the out-group, then it will be a marker of disdain and devalued, reflecting discrimination against the out-group. Such social categorization into an *us versus them* dichotomy is subjective but strongly driven by social criteria markers and with implications for how bilingualism is perceived (Tajfel & Turner, 1979).

Adding to the influence of social identity as a group marker are stereotypes (generalizations) and group status, both of which can determine how bilingualism is defined and viewed in a social context. As oversimplified views about a group, stereotypes tend to be viewed negatively—though they can also be viewed positively. Thus, Mexicans in the United States tend to be viewed as a low status group, and through stereotypes, so does the Spanish language they speak—a negative stereotype. The ethnic low status is generalized to the language spoken by the group—the stereotype. Yet, people who are from Spain, and who also speak Spanish, do not have a low status in the United States, and by implication the Spanish language they speak is viewed as clamorous, a language of romance—a positive stereotype. Again, social context solely determines how a particular second language within a society will be viewed.

If a minority (out-group) speaks a language different from a majority (in-group), bilingualism will be necessitated in the minority population, especially if the majority has high status. This is particularly the case for Spanish speakers in the United States, Inuit speakers in Canada, and Welsh speakers in Britain (Childs, 2004). In these countries, as well as others, at one time or another, bilingualism was viewed from a deficit perspective, thought to hinder character formation and even schooling (Hurtado & Vega, 2004). This debate can even be seen today in the United States and the debate over bilingual education, where bilingual education is thought by some people to hinder academic progress in school aged children, even though the evidence is contravening (See for example, Garcia this volume).

Assimilation and Acculturation Forces

Pressures to assimilate and acculturate have been pervasive in the United States since its early history (Allport, 1954). The melting pot concept in the United States, the idea that ethnic and racial differences should merge into a single culture, only supports one language. As such, immigrants in the United States have been expected to abandon their language and cultural background in exchange for the American dream—a cultural drive that did not allow for bilingualism. In fact, acculturation and assimilation pressures did work for early immigrants such as Germans, Russians, and Italians, among others. With succeeding generations, these immigrants became indistinguishable from the typical European American—they all became part of the same in-group, negating the need for bilingualism.

For other immigrants such as Chinese and Mexicans, for example, assimilation did not occur as smoothly due to their phenotype, or outer appearance, which continued to expose them to discrimination even to this date (Vega, 1994). These immigrants who did not fit the European American mold continued identifying with their cultural backgrounds to prevent isolation and to sustain social support in their adopted country, resulting in the maintenance of bilingualism. Still, assimilation pressures historically have kept pace, through schools not allowing immigrant students to speak their mother tongue and through English-Only initiatives and laws (Crawford, 1992; further elaborated later, under *attitudes and bilingualism*).

Consistent with social identity's predictions about the formation of in- and out-groups, immigrants who did not fit the mold for assimilation had two markers creating out-groupness, one was their language and the other their phenotype (appearance). With language mutable, immigrants could conceivably lose their mother tongue and adopt the new language, particularly if immersed in it from an early age. Given this scenario, these immigrants could expect linguistic assimilation, with bilingualism having a low chance of survival—such as it happened with the early American immigrants discussed previously. However, with phenotype immutable for many immigrants, the chances for cultural assimilation were greatly decreased, resulting in rejection and isolation from the dominant society and diminished opportunities (Telles & Murguia, 1990). Thus, within the minority in-group, bilingualism was valued, as it allowed for the maintenance of cultural identity, social support, and access to resources in the dominant society.

Bilingualism and Language Shift Processes

Today, bilingualism in the United States thrives because of ethnic identification, advances in civil rights legislation, and society's more accepting attitudes. As the United States increasingly accepts the idea of a multicultural society (Hamers & Blanc, 2000), some second- and third-generation immigrants have sought to regain their lost languages, though not in significant numbers (Childs, 2004; Tapia, 2000). By far, economic, social, political, and cultural forces continue to exert strong linguistic assimilation pressures, with most immigrants willing and wanting to learn and adopt English.

In a paper entitled *Shift happens . . .*, Hurtado and Vega (2004) examined bilingualism across three generations of Mexican Americans at local, state, and national levels in the United States. Their findings showed that with each generation, Spanish to English transition occurred, but that *receptive* bilingualism remained strong—the ability to understand the other language for which no proficiency is apparent. They argued that receptive bilingualism allowed Spanish-Only grandparents and English-Only grandchildren to communicate and understand each other. Still, the assimilation drive to merge with the dominant culture's language was strong, explaining why transition from Spanish to English monolingualism was assured by the third generation of these Mexican Americans.

The role of perceptions and attitudes has also been shown to affect the shift from Ebonics to Standard English (Fields, 1997). Fields reviewed the December 18, 1996 Oakland [California] Unified School District's resolution to adopt their board of education's decision to use Ebonics in teaching African American children. A national uproar erupted from that decision, with many opponents deriding the value of Ebonics and lamenting the harm done by depriving African American children from the needed transition to Standard English. The negative stereotypes and prejudiced views about Ebonics further fueled the controversy, with evidence and facts on the purpose of the resolution eschewed. All along, the goals of the resolution had been to facilitate the shift from Ebonics to Standard English, or at the very least to give the children the ability to *code-switch*—the ability of bilinguals to use both languages simultaneously. The lesson learned from this debacle was that language shift issues among African American children succumbed to rigid thinking, without canvassing the influence of culture, language, race, and education (Fields, 1997).

A similar case occurred in the U.S. border town of El Cenizo, Texas, on August 1999. The city had a population of 7,800 people, of whom 90% spoke Spanish, though some also spoke English. To involve the city's residents in government's decisions and to reduce the populace's political

apathy, the city commissioners issue an ordinance to make Spanish the official language of city government—a pragmatic decision given the city's Spanish speaking population (Contreras, 1999, September 10; Diaz, 1999, August 19) The incident attracted international attention—an American city declaring Spanish the official language of government!—and it was an incident that was largely viewed by most Americans as a threat to the sovereignty of the United States.

Despite the uproar brought about by the Spanish ordinance at El Cenizo, the ordinance remains on the books to this date. Official documents are in English, as are meeting agendas for governmental meetings, but the meetings are conducted in Spanish. *But no one gets penalized for lapsing into English, because border residents often use a bilingual mix in everyday talk* (Castillo, 2005, ¶ 21). Again, this incident illustrates the role of the social context in how bilingualism is likely to be viewed and accepted. Because mandating English use in the United States involves infringements on the First Amendment, a status quo has been maintained at El Cenizo, with both Spanish and English thriving—although society wide the pressure is to use English.

Bilingualism and Attitudes: Stereotypes and Status

As mentioned earlier, group status can determine perceptions of bilingualism. A high-status group is not likely to adopt bilingualism as it can set the terms for social accommodation and interaction. Accommodation typically implies that bilingualism is accepted within the social context where it occurs, but it does not imply that it is viewed positively by the high-status group. In this case, a low-status group has no choice but to be bilingual if it wishes to have social mobility (Giles & Coupland, 1991; Wright, Taylor, & Moghaddam, 1990). The question emerges as to how the majority imposes its language on the minority, besides having higher status (Stangor, 2000). To this end, the majority group can use attitudes, stereotypes, and the ability to create biased perceptions in society about the minority group, often with negative consequences.

Attitudes and Bilingualism

Attitudes are evaluations that can be positive or negative, with influence at the cognitive, affective, and behavioral levels (Allport, 1954). From a developmental perspective, how bilingualism is perceived is determined by attitudes of the in-group and out-group (Giles & Coupland, 1991). When relations between groups are good, respect is mutual, equal status prevails, and linguistic accommodation takes place (Hogg & Abrams, 2001). One example is in Scandinavia, where proficiency in two or more languages is encouraged and expected due to geographic proximity among countries. Another example is Canada, where both English and French are official languages. However, even when two languages are afforded equality before the law, at the attitude level, group friction can remain. Recent separatist efforts by Quebec illustrate how English is still afforded more status within Canada (cognitive and affective attitude levels). Even though by law both languages are or should be on equal footing, discrimination remains (behavioral attitude level; Collins, 1999).

Attitudes about bilingualism can be confounded with language, political, historical, economic, and social conditions. Of all these, language is readily observable and a likely target of negative attitudes by the majority. Also, as mentioned in the discussion on assimilation and acculturation, language is more easily malleable than phenotype. Some minorities can try to pass as members of the majority (Vega, 1994), but these individuals are only a few. Directing negative attitudes

against appearance constitutes a blatant act of discrimination (behavioral attitude). Today, such blatant acts are rare. Instead, negative attitudes against language represent a more convenient and subtle form in which a majority can discourage bilingualism—and these are disguised through the English-Only movement.

According to Crawford (2005), who has done the most research on the English-Only movement, this type of legislation emerged in 1981, as a constitutional amendment. Although the *English Language Amendment* would have needed a two-thirds vote in the House and Senate, and would have had to be ratified by three quarters of state legislatures, the amendment has not come to a Congressional vote. However, as of 2003, the most recent data, 26 states have a myriad of laws on official English legislation. Of these, Hawaii is officially bilingual, and Alaska and Arizona have had their English-Only initiatives declared unconstitutional, leaving 23 states with active Official English laws. English-Only advocates have recognized the improbability of passing a constitutional amendment. Consequently, today their efforts are spent on passing statutory legislation that establishes Official English laws. Such forms of laws would only make English the official language of government, and would only require a simple majority vote in Congress and state legislatures. The effects of such legislation remain unclear, and if passed, their interpretation will be determined by courts (Crawford, 2005). Still, at an implicit level, these initiatives send the message that bilingualism is discouraged and negatively viewed at a societal level in the United States.

Society's attitude on bilingualism in the United States is a negative one. Bilingualism by law has been discouraged (cognitive and affective attitude levels), and actively suppressed (behavioral attitude) in some places in previous decades (Hurtado & Vega, 2004). The result is that a minority group will maintain its mother tongue due to ethnic identity (in-group allegiance) while the majority group will disparage it. In turn, this represents attitudes as negative evaluations. For the most part, negative attitudes about bilingualism are dominant throughout the world, with exceptions where accommodation has occurred through either law or social enlightenment (Giles & Coupland, 1991).

Hurtado and Rodriguez (1989) present evidence where Spanish use was repressed in south Texas ever since Spanish speakers have lived in that state. Similar cases have been documented throughout the Southwest, as evidenced by Spanish speakers being terminated from their work places for not speaking in English, students in schools being forced to speak only English, and in some cases, eliciting physical punishment if they spoke in Spanish (MacGregor-Mendoza, 2000). Again, this represents a manifestation of negative attitudes against the out-group, marked by different phenotype—which is unchangeable, and language, which is changeable and was the target of discrimination.

Stereotypes and Bilingualism: Not All Negative

Stereotypes are generalized perceptions and expectations that can control behavior (Fiske 1993; Hamilton, 1981; Stangor, 2000). Stereotypes can influence how people view bilingualism. As mentioned earlier, when bilingualism was viewed from a deficit perspective, thought to hinder character formation and even schooling (Hurtado & Vega, 2004), stereotypes became embedded in the social fabric. The most adverse consequence of this process is that in-group members can

internalize those stereotypes (Clark & Clark, 1939), with feelings of shame or guilt displayed by those who are bilingual.

Generalized, negative views on bilingualism become manifested through reciprocal expectations. If a minority person displays bilingualism in a social interaction, a person's reaction in the majority group may appear to contain animosity and in turn, the person in the minority group may react in a similar fashion. The result is an escalation of the negative expectations that the majority and minority members have of each other—a process that works very subtly (Rosenthal & Jacobson, 1968). However, it must be noted that these stereotypes do not have to be negative. They can be positive as well.

In the United States, a person who has a French accent is viewed as sophisticated, educated, and perhaps even exotic, likewise for someone with an Italian accent. Not so for people with Spanish, Asian, or Arabic accents (Vega, 1994). This highlights the role of the social construction of stereotypes and how they can be negative, or positive (Hamilton, 1981; Stangor, 2000). Allport (1954) further demonstrates how accents connote social status, elicit value judgments, and ultimately can lead to prejudice toward the person who speaks with an accent. However, in the United States it is the social status connotation of the group in question that will determine how that accent will be viewed—a high status group with an accent might be viewed positively (French), whereas a low status group might be viewed negatively (Mexican).

Status and Enhancing/Inhibiting Factors of Bilingualism

By now, it should come as no surprise that how bilingualism is perceived is a function of the social context of group contacts—conflict or conciliation. Groups that are of equal status and on equal footing are more likely to be receptive of bilingualism. When status differences exist, then the higher status group is more likely to enforce a view, and it will be one where bilingualism (using the language of the out-group) may not be favorably viewed.

From a social psychological perspective, group conflict is likely to create animosity between groups, with bilingualism not likely to flourish. Adding to the flames, the nature of this conflict does not have to be real or based on actual competition between groups (Sherif, 1958). Rather, Tajfel and Turner (1979) have shown that social categorization, or the mere psychological separation into in-group and out-group, is sufficient to create conflict. With bilingualism being a group marker, and group allegiance driving motivations, bilingualism by itself is likely to create group friction, necessitating attitude re-alignment for acceptance, particularly in the high status group. Thus, how bilingualism is perceived and viewed is a function of group dynamics, particularly group status and social categorization (Reid & Ng, 1999).

Intergroup Influences on Bilingualism

Culture, context, attitudes, stereotypes, group status, and social identity/categorization have been shown to influence how bilingualism is perceived between groups. Still, the question remains as to how perceptions about bilingualism persist and endure? That is, what mechanisms determine whether bilingualism is embraced or disdained between groups? The answer is cultural and social norms, which will now be explained.

Social Expectations and Normative Influences

Asch (1956) showed that groups are influential in imposing their will on the individual, particularly when they are a numerical majority. In what has become one of the most cited and classic studies in social psychology, Asch did a demonstration where one by one of seven confederates (stooges) would provide a wrong judgment in comparing the lengths of two lines, with a naïve participant asked to endorse or reject the judgment. As the last person to make the judgment, the naïve participant had to face the quandary of endorsing or opposing the group. Asch showed that two thirds (66%) of the time the naïve participant went along with the wrong judgment of the group, even though objective reality dictated otherwise. Asch's study demonstrated that groups are powerful in inducing compliance.

In the case of bilingualism, once a majority has formulated the opinion that bilingualism is of no value, a norm to devalue it will become dominant and enforceable through disdain from the majority. The participants in Asch's (1956) study who complied did so because they did not want to look uncooperative and they wanted to fit in—they complied even at the cost of personal agony. However, it must be noted that a majority is not necessary to induce compliance, as one study (Moscovici & Personnaz, 1980) showed that minorities who persistently present their view are capable of altering perceptual judgment and induce compliance. Again, compliance is the result of wanting to fit in and going along with the group. If the group favors bilingualism, then members of the group will endorse and enforce those norms. An opposite action would be expected if the group does not favor bilingualism.

Social Power and Group Dominance

Norms enforce a group's wishes and are one way for a group to manifest power. As well, a group can display its power by its ability to wield resources but even more subtly, by its ability to stereotype and categorize the out-group. Sherif (1936) showed that norms emerge from a consensus to agree on information. The same intergroup dynamics discussed earlier in regards to the role of the in-group and out-group reinforce norm formation and group dominance.

Specifically, when immigrants move into a new community, they bring with them their language and cultural background. If prejudiced people are the first to voice their views about the immigrants, then those voices will set the norms for social interactions (Sherif, 1936), increasing discrimination against those immigrants (Asch, 1956). An opposite scenario would be true if welcoming comments were first voiced about the immigrants.

As can be seen, social power and dominance have a contextual influence and are not necessarily inherent to a group's nature. What brings complication to views on bilingualism is historical, political, and economic dimensions that are channeled through the prism in which a group views another group—not just the social psychological dimension (Allport, 1954; Hurtado & Vega, 2004). Nonetheless, the social psychological approach to bilingualism implies a role for the situation, which can be changed, through laws, civil rights, and even attitudes.

Social Conflict and Group Negotiation

Social conflict can be constructive in intergroup relations by introducing a system of checks and balances and by maintaining social justice in the forefront. Views on bilingualism do not have to be oppressive. Ample evidence exists that groups can come to an accommodation (negotiation)

when it comes to bilingualism, especially in a multicultural society (Giles & Coupland, 1991). Equally important, practical reasons can also have an effect on the nurturing of bilingualism in a society, such as the case in Miami, where being bilingual is commensurate with higher economic dividends (Reveron, 2001; Tapia, 2000).

Bilingualism as Social Reality

Perceptions of bilingualism in a society are determined by the social reality shared by the members of the different groups. While the value of a second language is undisputed (Germano, 2004, June 11), the value assigned to bilingualism is subject to fluctuations. Categorizing people as part of one's group or not (i.e., cognitive categorization) can put a lower value on bilingualism; that is, the mere presence of in- and out-groups provides a value judgment on how bilingualism is viewed. Norms that value one language over another can also set the tone for how bilingualism is perceived. Subtle, internal, and individual processes such as expectations, attitudes, and stereotypes can also dictate the role that bilingualism will play between groups. Still, bilingualism is tied to human communication and can be highly adaptable to different social contexts.

Biology and Context Effects

From a biological perspective, no one language has more value than any other. It is through the social context that a language gains differential values. Evolutionary theorists have posited that language was originally developed for pure communication purposes, such as when monkeys signal each other with an alarm call when they see a snake or an eagle (Wade, 2003). Eventually, the need to get along with others, reduce social conflict, and maintain social order necessitated the introduction of a social psychology into primitive communication systems. In fact, Wade cites evidence showing that 63% of human conversation is devoted to matters of social interaction, such as gossip, rather than the exchange of factual information. In this context, bilingualism increases the number and kinds of communication venues with others, implying increased social interaction and potential harmony among groups. However, as it has been shown so far, and in an ironic twist, bilingualism can actually impede group relations by the presence of in-groups and out-groups—again, a social context influence.

The inherent nature of in-groups and out-groups can bring about social conflict when bilingualism serves as a group marker. Bilingualism does not contribute to the cementing of social relationships if one group does not partake in bilingualism (i.e., the high-status group) on the one side. On the other, the bilingual group can benefit from access to the resources of the group with whom it shares a language. But even then, conflict can still arise because of competition for resources (Sherif, 1958), where the group who has the power sets the tone for social interaction. Under such competition for resources, the dominant group will either validate bilingualism (managers hiring bilingual personnel), or devalue it (monolingual managers hiring people like themselves). Thus, from a biological perspective, languages are equal, but the social context where communication takes place renders them unequal (Fields, 1997). The social context can set the negative tone about bilingualism, even when there appear to be equivocal explanations: Is negative stereotyping due to the use of bilingualism or ethnic group marker?

The Role of Culture in Bilingualism

According to Triandis (1994), culture is society's memory of its customs, norms, mores, dreams, and goals. With language highly intertwined with culture, one can see how a bilingual person would be influenced by the confluence of two languages and two cultures. In fact, most educators today believe that to learn a second language well, one must be immersed in its culture (Germano, 2004, June 11). A bilingual's social identity is forged from their exposure to two languages and to two cultures (Anzaldua, 1987; Hayes-Bautista, 1999). In addition, it can be argued that the role of norms in how bilingualism is viewed within a society also carries cultural vestiges that are likely to affect attitudes and perceptions of bilingual individuals. That is to say, perceptions of bilingualism do not occur in a vacuum, but are rather governed by collective and cultural memory in the form of norms, rules, and goals.

Bilingualism: Social Independence or Dependence?

From the current discussion, it would appear that perceptions of bilingualism in a given society are rigid, norm driven, and scripted. This implies determinism, dependence, and conformity. However, even within the most restrictive societies, bilingualism can manage to survive—through in-group support, through ethnic pride, and through economic purchasing power, such as is the case in Miami, where the large, affluent Spanish population is catered to in their native language (Tapia, 2000). A similar trend is occurring nationwide as the Spanish speaking population gains affluence and commercial interests pay attention to them.

Adding to an increase in positive views about bilingualism, and a backlash against the norm of a monolinguals society, are third generation immigrants in the United States who seek to re-encounter their ancestral cultures as well as their lost languages (Giles & Coupland, 1991; Tapia, 2000). Thus, U.S. society's pressure for using English only may be a norm, but it is a norm that will not be followed by everyone. Just as some participants rebelled against following the group in the Asch (1956) study, so too in the larger U.S. society, where the norm is present for English only but Spanish stands in defiance as outlined earlier—due to commercial interests, group loyalty, cultural maintenance, and in some cases, as an affirmation of identity (Anzaldua, 1987).

Also, breaking from the norm can be seen in recent governmental appointments, where Spanish was used in high cabinet appointments, with the U.S. Senator from Florida, Mel Martinez, congratulating the new Attorney General of the United States, Alberto Gonzalez. Even President George W. Bush has gone against the norm by speaking Spanish on some occasions—legitimizing bilingualism to some extent.

Summary and Conclusion

That bilingualism may succumb to linguistic assimilation forces is not a viable proposition in today's world. The need to be bilingual has become rooted in economic, social, political, and cultural forces. Bilingual persons stand to make more money (Tapia, 2000), particularly in communities with large immigrant populations. Globalization pressures and the need to do business with other cultures necessitate bilingualism. Politicians try to earn votes by speaking immigrants' language or at least some foreign language words, such as President Bush in his 2000 and 2004 presidential campaigns. The war on terrorism also necessitates more bilingual individuals, particularly

of Arabic languages. It has been estimated that as of this writing, most intercepted messages from terrorists have not been translated due to a lack of bilingual personnel (Frieden, 2004). Again, these changes illustrate the role of context in shaping perceptions about bilingualism, in this case by practical reasons brought to the forefront.

The purpose of this chapter was to show the importance of social psychological approaches to the study of bilingualism. Social psychology allows us to understand how the social context affects perceptions, social attitudes drive acceptance, stereotypes can promote prejudice or acceptance, in- and out-groups can dictate preferences, norms enforce views, and how social identity is inherent to bilingualism. Particularly, the role of the social context and situation has been argued to be influential in the receptivity of bilingualism.

The message from social psychology is one of hope, for situations can be changed, attitudes can be altered, and perceptions re-interpreted. With social perceptions often entangled with personal, cultural, and society's values, negative views about bilingualism are inevitable (Allport, 1954; Childs, 2004). Yet perceptions about bilingualism can be positively changed. To quote a statement from Allport's famous *nature of prejudice* book, ". . . stateways, at least as expressed in the Constitution, are in advance of folkways" (p. 471), which means that just as society's laws (or norms) can have a negative influence, they are just as likely to be made to have a positive influence—acceptance of bilingualism. The challenge for the future is to change negative attitudes to positive ones, promoting bilingualism's virtuosity and vitality (Giles & Coupland, 1991).

Because 70% of social psychology researchers are in the United States, a primarily monolingual country, social psychology has done little direct research on bilingualism. In fact, most bilingualism research done by social psychologists has been done in Canada and Europe, with few exceptions (Triandis, 1994; Hurtado & Vega, 2004). The reader is referred to Smith and Bond's (1999) work on social psychology across cultures for specific social psychological studies done with bilingual populations. For the most part, social psychology has been confined to the college sophomore population, with the need for social psychological research with bilingual populations in great need.

Some comments on the methods that social psychologists use to study bilingualism are warranted. Although bilingualism is not studied directly within social psychology, findings from the field inform and explain the phenomenon of bilingualism through attitudes, norms, perceptions, and generally speaking, how bilingualism is viewed by a society and individuals. Social psychological findings are primarily based on experimental studies, which allow us to eliminate competing explanations (see Marian, this volume). Thus, we know that norms influence bilingualism more so than a person's personality. By extrapolation, we know that a person's ability to be bilingual will be largely determined by how society views the use of two languages, and not necessarily how the person feels. This is the case because social psychologists have shown through experimental studies that norms are stronger determinants of behavior than personality. Social psychology also makes use of correlational studies, such as the case where accent is shown to be related to the age when the person first started to learn the second language. In this case, age was not directly manipulated, but the relationship is inferred and measured through correlational analysis. Still, the mantra that *correlation* does not imply *causation* is as true in social psychology as it is in experimental psychology.

To conclude, and returning to the case of my brother's problems with the Spanish /r/, I am happy to report a positive outcome, for he did learn to perfectly roll his *r's* and went on to become a successful oratory speaker. Likewise for bilingualism in modern times, I am happy to report that it is becoming more accepted and an increasing number of people are becoming bilingual, particularly in multicultural societies. As travel, technology, and a global economy become more intertwined, it is my hope that bilingualism will continue to flourish and be imbued by receptive

norms, positive stereotypes, embraced by people's social identities, and viewed through a prism of positive attitudes.

List of Key Words and Concepts

Attitudes, Assimilation, Culture, Identity, In-Group, Intergroup Relations, Norms, Out-Group, Power, Status, Stereotypes

Internet Sites Related to Social Psychology and Language

Social Psychology Network: http://www.socialpsychology.org/
Journal of Language and Social Psychology: http://www.sagepub.com/journal.aspx?pid=86
The Psychology of Language Link: http://www.psyc.memphis.edu/POL/POL.htm

Discussion Questions

1. Discuss how society level forces influence views on bilingualism.
2. Explain how a society can use assimilation pressures to discourage bilingualism.
3. Why is a low-status group more likely to embrace bilingualism than a high-status group?
4. How do we know an out-group has a negative attitude about bilingualism?
5. How do stereotypes influence views on bilingualism?
6. Explain how norms encourage or discourage the adoption of bilingualism.
7. How does group status encourage or discourage the adoption of bilingualism?
8. What does it mean when we say that bilingualism is influenced by the "social context"?
9. What is the influence of biology on bilingualism?
10. How can society encourage the use of bilingualism, or even trilingualism (three languages)?

Suggested Research Projects

1. Choose three related articles on bilingualism and social psychology from the *Journal of Language and Social Psychology, Journal of Social Issues,* or from any other psychological journal related to language and social psychology. Write an analysis for each article, focusing on the (a) validity of the premises and conclusions of the study, (b) methodological strengths and weaknesses of how the study was conducted, and (c) alternative explanations of the findings (conclusions) and whether or not they can be ruled out. These exercises will help you understand the dynamic nature of research on bilingualism and social psychology.
2. Visit http://www.findarticles.com and search the literature on a topic that involves social psychology and bilingualism. Please make sure you choose an empirical article, one where they do a study and actually analyze data, rather than using newspaper or magazine articles, which merely review evidence. Once you have selected an updated article (less than a year old), make an assessment about the current state of knowledge in your chosen topic. Write an analysis where you discuss what you perceive to be the progress made so far in that topic,

what are some current issues that need further clarification, and what recommendations you have for further research in that area.

Suggested Readings: Classic Readings in Social Psychology and Language

Hamers, J. F., & Blanc, M. H. A. (2000). *Bilinguality and bilingualism* (2nd ed.). Cambridge, England: Cambridge University Press.

Giles, H., & Coupland, N. (1991). *Language: Contexts and consequences*. Pacific Grove, CA: Brooks/Cole.

Krauss, R. M., & Chiu. C. Y. (1998). Language and social behavior. In D. Gilbert, S. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (4th ed., pp. 41–88). New York: Guilford.

References

Allport, G. W. (1954). *The nature of prejudice* (1st ed.). Menlo Park, CA: Addison Wesley Publishing Company.

Anzaldua, G. (1987). *Borderlands: The new mestiza–la frontera.* San Francisco: Spinsters/Aunt Lute.

Asch, S. (1956). Studies of independence and conformity: A minority of one against a unanimous majority. *Psychological Monographs, 70*, 1–70.

Castillo, M. (2005, September 6). El Cenizo is booming on the border. *Express-News Border Bureau*. Retrieved September 30, 2005, from http://www.mysanantonio.com/news/mexico/stories/MYSA090605.01B.EL_CENIZO.d4716bc.html

Childs, M. R. (2004, August 13). The practical linguist: Welsh experiences of bilingualism. *The Daily Yomiuri (Tokio),* p. 14.

Clark, K. B., & Clark, M. K. (1939). The development of consciousness of self and the emergence of racial identification in Negro preschool children. *Journal of Social Psychology, S.P.S.S.I. Bulletin, 10,* 591–599.

Collins, M. (1999). Quebec: Social union or separation? [Electronic version]. *Contemporary Review.* Retrieved October 31, 2004, from http://www.findarticles.com/p/articles/mi_m2242/is_1598_274/ai_54405258

Contreras, R. L. (1999, September 10). A little town in Texas roars in Spanish (Commentary). *La Prensa San Diego.* Retrieved September 30, 2005, from http://www.laprensa-sandiego.org/archieve/sept10/texas.htm

Crawford, J. (1992). *Hold your tongue: Bilingualism and the politics of English only.* Reading, MA: Addision Wesley.

Crawford, J. (2005). Issues in U.S. language policy: Language legislation in the U.S.A. *James Crawford's Language Policy Web Site.* Retrieved September 30, 2005, from http://ourworld.compuserve.com/homepages/JWCRAWFORD/langleg.htm

Diaz, M. B. (1999, August 19). Border city goes all-Spanish. *English First.* Retrieved September 30, 2005, from http://www.englishfirst.org/elcenezo/elcenizoap81999.htm

Fields, C. D. (1997). Ebonics 101. What have we learned? *Black Issues in Higher Education, 13,* 18–21.

Fiske, S. T. (1993). Controlling other people: The impact of power on stereotyping. *American Psychologist, 48,* 621–628.

Frieden, T. (2004, September 27). *FBI getting lost in translations: Half-million hours of intelligence materials not yet in English.* Cable News Network. Retrieved October 31, 2004, from http://www.cnn.com/2004/LAW/09/27/fbi.translation/

Germano, W. (2004, June 11). Parlez-vous anything? *Chronicle of Higher Education,* Supplement, B16.

Giles, H., & Coupland, N. (1991). *Language: Contexts and consequences*. Pacific Grove, CA: Brooks/Cole.

Hamers, J. F., & Blanc, M. H. A. (2000). *Bilinguality and bilingualism* (2nd ed.). Cambridge, England: Cambridge University Press.

Hamilton, D. L. (1981). *Cognitive processes in stereotyping and intergroup behavior*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Hayes-Bautista, D. E. (1999, March 28). On being Latino: As American as a Texan. *Los Angeles Times,* p. M1.

Hogg, M. A., & Abrams, D. (2001). *Intergroup relations: Readings in social psychology.* Philadelphia: Psychology Press.

Hurtado, A., & Rodriguez, R. (1989). Language as a social problem: The repression of Spanish in south Texas. *Journal of Multilingual and Multicultural Development, 10,* 401–419.

Hurtado, A., & Vega, L. A. (2004). Shift happens: Spanish and English transmission between parents and their children. *Journal of Social Issues, 60,* 137–155.

Krauss, R. M., & Chiu, C. Y. (1998). Language and social behavior. In D. Gilbert, S. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (4th ed., pp. 41–88). New York: Guilford.

MacGregor-Mendoza, P. (2000). Aquí no se habla Español: Stories of linguistic repression in southwest schools. *Bilingual Research Journal, 24,* 333–345. Retrieved September 29, 2005, from http://brj.asu.edu/v244/articles/art3.html

Moscovici, S., & Personnaz, B. (1980). Studies in social influence: V. Minority influence and conversion behavior in a perceptual task. *Journal of Experimental Social Psychology, 16,* 270–282.

Myers, D. G. (2005). *Social psychology* (8th ed.). Boston: McGraw-Hill.

Reid, S. A., & Ng, S. H. (1999). Language, power, and intergroup relations. *Journal of Social Issues, 55,* 119–139.

Reveron, D. (2001, January 21). Miami: The capital of Latin America e-commerce. *Hispanic Bussiness.com,* Retrieved October 25, 2004, from http://www. hispanicbusiness.com/news/newsbyid.asp?id=3014

Rosenthal, R., & Jacobson, L. (1968). *Pygmalion in the classroom: Teacher expectation and pupil's intellectual development.* New York: Rinehart & Winston, Inc.

Sherif, M. (1936). *The psychology of social norms.* New York: Harper & Row.

Sherif, M. (1958). Superordinate goals in the reduction of intergroup conflicts. *American Journal of Sociology, 63,* 349–356.

Smith, P. B., & Bond, M. H. (1999). *Social psychology across cultures* (2nd ed.). Boston: Allyn & Bacon.

Stangor, C. (2000). *Stereotypes and prejudice: Readings in social psychology.* Philadelphia: Psychology Press.

Tajfel, H. (1981). Social stereotypes and social groups. In J. C. Turner & H. Giles (Eds.), *Intergroup behavior* (pp. 144–167). Oxford, UK: Blackwell.

Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations.* Monterey, CA: Brooks/Cole.

Tapia, S. T. (2000, April 11). English isn't the issue in Miami; the goal is fluency in languages. *The online service of the Arizona Daily Star.* Retrieved October 31, 2004, from http://www.azstarnet.com/bilingual/day3-3.html

Telles, E. E., & Murguia, E. (1990). Phenotypic discrimination and income differences among Mexican Americans. *Social Science Quarterly, 71,* 682–695.

Triandis, H. C. (1994). *Culture and social behavior*. New York: McGraw-Hill.

Wade, N. (2003, July 15). Early voices: The leap to language. *New York Times,* p. F1.

Wright, S. C., Taylor, D. M., & Moghaddam, F. M. (1990). Responding to membership in a disadvantaged group: From acceptance to collective protest. *Journal of Personality and Social Psychology, 58,* 994–1003.

Vega, L. A. (1994). Differential effects of discrimination on the ethnic identity of Mexican Americans: The role of the person and the situation. (Doctoral dissertation, University of California, Santa Cruz, 1994). *Dissertation Abstracts International, 56,* AA95-00553.

Chapter 10

The Social and Cultural Contexts of Bilingualism

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There can be no divided allegiance here … We have room for but one language here, and that is the English language, and we intend to see that the crucible turns our people out as Americans. (Twenty-sixth U.S. President Theodore Roosevelt, to the American Defense Society, January 3, 1919)

So if you want to really hurt me, talk badly about my language. Ethnic identity is twin skin to linguistic identity—I am my language … Until I am free to write bilingually and to switch codes without having always to translate, while I still have to speak English or Spanish when I would rather speak Spanglish, and as long as I have to accommodate the English speakers rather than having them accommodate me, my tongue will be illegitimate. (Anzaldúa, 1987, p. 59)

Our new immigrants must be part of our One America … We have a responsibility to make them welcome here; and they have a responsibility to enter the mainstream of American life. That means learning English … (Forty-second U.S. President William Clinton, State of the Union Speech, January 19, 1999)

Introduction

Language diversity is not a relatively new phenomenon, and concerns about language diversity can be found in some of the world's oldest stories and mythologies. The Bible story of Babel related in *Genesis* is one example (*Genesis* 11:4–9). According to the biblical story, people once spoke only one common language until they angered God and he punished them. As the story goes, after the Flood, Noah's descendants decided to build a mighty tower that would reach up to Heaven. God, however, was offended by their efforts, and chose to punish the people for their arrogance by making them all speak different languages. Because they were unable to speak to each other, they couldn't cooperate and build the tower. Known as the *Curse of Babel*, the story characterizes linguistic diversity as a punishment, and multilingualism as a liability that makes it hard if not impossible for people to cooperate and work together. In the story, language is portrayed as a limiting and debilitating obstacle, suggesting that multilingualism or, rather, the absence of a single, common language, serves to divide and hinder people's abilities to cooperate and advance.

Historically, various languages have been present within the current political borders of the United States. Hundreds of languages were spoken in North America before European contact with the Native Peoples who had populated the continent for centuries. Immigrants and incorporated peoples from all parts of the world have also retained aspects of their language as they have become residents and citizens of this country. Contrary to the popular perception of the United States as a homogeneous, English monolingual and monocultural state, language diversity has been and remains an important feature of U.S. society. But, in spite of the fact that the United States has been multilingual from its inception, there is no question that English is by far the dominant language and *lingua franca* in the United States as it is throughout the world. English is for all practical intents and purposes the de facto official language and is without doubt the dominant language of politics, business, and education, and is spoken (with varying degrees of fluency and in many different dialects) by the vast majority of people in the United States. However, an official language or national language policy does not exist. Rather, there are various policies that do not reflect a consistent theory of language use and choice or ideology about language rights, and which often reflect different values and competing ideas about language.

This chapter operates under the assumptions that there is an inextricable link between the prevalent definitions of race/ethnicity, culture, and language (between what is popularly deemed a "foreign language" [not English] and the imposition of an ascribed non-American[1] "foreign origin" [the perception of not having U.S. citizenship irrespective of place of birth] in the United States). As much as *e pluribus unum* (one out of many) is undoubtedly a great strength, it is also a point of tension and, as U.S. history shows, has often been a source of strife. The conflict over language policy has deep social and cultural foundations, and the debate about language use and choice reflects tension between bilingualism and individual, group, and national identity. As Hakuta (1986) writes, "Bilingualism, in addition to being a linguistic concept, refers to a constellation of tensions having to do with a multitude of psychological, societal and political realities" (Hakuta, 1986, p. 9). There is a clear social and cultural context that underlies language laws and policies, which are inseparable from historical factors, immigration laws, and prevailing social attitudes that are intimately coupled with issues of difference, race/ethnicity, and culture. Ideas about language use and choice also have everything to do with prevailing notions of American identity.

This chapter will discuss the social and cultural contexts of bilingualism in the United States at the dawn of the twenty-first century. In order to capture the various angles that define the social and cultural contexts of bilingualism, the chapter is divided into three parts: historical,

demographic, and language laws and policies. First, the chapter will discuss the historical record and national language policy; U.S. *expansion*, *Americanization* and diversification; and immigration and language diversity at the turn of the twentieth century. Second, it will discuss changing demographics and growth among the language minority population today, and present a case study on Latin American immigration and discuss questions surrounding the integration of Latinos.[2] Lastly, it will discuss federal protections offered to language minorities, the English Only movement, English-only laws and policies, and take a close examination of the education of language minority students.

This chapter will discuss the historical record regarding language policy since the inception of this country. It will illustrate how language policies have been and continue to be used as one tool to incorporate new Americans, and which often reflect anti-immigrant attitudes and competing values about identity and language rights. In the past, increased immigration triggered fear, and evolving diversity caused concern about the incorporation of immigrants stemming from notions of what it means for new Americans to enter U.S. society. More often than not, population changes were met with anti-immigrant attitudes and policies that restricted the options and rights of immigrants and minority groups. As part of efforts to incorporate new peoples, often forcibly, *assimilationist* strategies were employed, meaning tactics intended to force minority groups to adopt the culture, language customs, and lifeways of the majority while giving up those of their home/native countries and cultures of origin. As shall be discussed, language was historically recognized as the powerful tool that it is, and was often used to further the goals of full cultural and linguistic *assimilation* of immigrant and minority groups into the dominant Anglo-American culture. Such was the case with Native Americans, and immigrants in the early twentieth century, and such is the case with Latinos today. As we shall see, language was used and continues to be used as a proxy for race/ethnicity and as a tool to exclude immigrant and minority groups, notably during periods of profound demographic change. New immigrants need appropriate policies that will help to integrate them into the U.S. mainstream. The new post-1965 immigration, and the growth among the Latino population in particular, has raised a host of social policy issues and placed new demands on government and its ability to integrate the new Americans who are reshaping America. This chapter will show how the absence of an official language or national language policy has resulted in various actions taken at various levels of government and civil society; measures that reflect different values and ideas about identity and language rights. This chapter will explore questions of language and bilingualism and their relationship to those goals today and in the past.

The U.S. Historical Context and the Absence of a National Language Policy

Unlike the Spanish who imposed strict language policies on their colonies in the Americas, the English implemented no such policies on the (White-Anglo-Saxon-Protestant) citizenry as they colonized the United States. Although English has effectively been the dominant language since the founding of the thirteen colonies, most people would be surprised to learn that English is not the official language in the United States. One important question is why didn't the nation's founders name an official language?

Because language is intimately tied to culture and heritage, it is possible that the early colonists saw native language maintenance and language choice as part of their right to preserve their

heritage (Crawford, 1999). However, as shall be presented, there has always been an intimate link between language and power, and throughout U.S. history language has reflected the relationship between the majority and minority groups as language dominance has been the privilege of the group that holds power. For example, African slaves were forbidden from using their native languages and were punished by their White slave owners if they did. However, they were also forbidden from learning to read and write in English and risked doing so under fear of brutal punishment. Teaching slaves to read and write was considered a crime for both Whites and Blacks. White slave owners clearly recognized that language, education, and emancipation were intimately tied. Denying African slaves their languages and the ability to become literate helped to strengthen White domination and ensure the enslavement of African peoples.

Clearly, the potential for conflict over language existed in the United States from its inception. Hechinger (1978) and Ovando (2003) argued that the founders envisioned "A country with a unified history, with unified traditions, and with a common language" (Hechinger, 1978, p. 130). Given the nation's history, it is hard to believe otherwise. As John Jay poignantly wrote in Federalist Paper Number 2: "With equal pleasure I have as often taken notice that Providence has been pleased to give this one connected country to one united people—a people descended from the same ancestors, speaking the same language, professing the same religion, attached to the same principles of government, very similar in their manners and customs." It would seem that the founders assumed America would be a culturally homogeneous White-Anglo-Saxon-Protestant nation, and that they had no reason to make English the official language because all those considered "true Americans" already spoke it (Schildkraut, 2005, p. 11).

In keeping with the views of John Jay, some of the founders felt the designation of a common official language was necessary for the success of the country. John Adams proposed establishing an English Language Academy to set standards for English. However, it was debated and subsequently rejected by the Continental Congress because it was believed to be an inappropriate role for government and deemed incompatible with the American freedom of spirit (Heath, 1976). At the time, the Continental Congress published many important official documents in English, French, and German (Perea, 1992). As D. F. Marshall writes, "The founding fathers of our country did not choose to have an official language precisely because they felt language to be a matter of individual choice" (Marshall, 1986, p. 11). The first bill concerning language the U.S. Congress ever voted on was in 1795. The proposed bill, which was rejected, would have allowed the government to print its laws in both English and German. A second bill to follow later that year mandated that all federal statutes be published in English only. The bill was approved by the Congress and signed by George Washington (Schildkraut, 2005, p. 12).

The historical record indicates that at the nation's founding, some of the founders felt an official language would compromise the ability to form and sustain a union, whereas others felt an official language was necessary to do so. In spite of, or perhaps because of, this conflict, the nation's founders did not adopt "an official language nor a government-sanctioned body to regulate speech" (Crawford, 1999, p. 22). Arguably, at the time, it is possible that the government somewhat supported multilingualism and the use of languages other than English as the founders generally promoted a nationalism based on agreement over democratic principles, and not language and culture (Crawford, 2000). For example, after the Revolutionary War, the Articles of the Confederation were published in English, French, and German (Perea, 1992). This would support the hypothesis that the founders sought to transcend linguistic differences and build a nation based on principles, and without language as a prerequisite. However, some believe that there was a policy of official English from the beginning. Hernandez-Chavez (1995) argues that because the Declaration of Independence, the Constitution, and all key U.S. documents are written in

English, it is tantamount to an official English policy. He concludes that, therefore, English was clearly meant to be the official language of the new nation, the language of citizenship and of all legislative, judicial, and administrative matters (Hernandez-Chavez, 1995, p. 141). From the perspective that English as the official Language was implied or understood, Hernandez-Chavez may be right. However, although it may, at best, have been implied, official English was not explicitly defined, and therefore, arguably, any implication holds no water.

The question of official English is open to interpretation. That there is no mention of an official language in the U.S. Constitution, in light of the fact that the issue was discussed among the nation's founders, can be interpreted to mean either an implicit tolerance of multilingualism or the absence of such. Did the founding fathers *intend* for there to be an official language? Did they understand official English as implicit, as something obvious that went without saying, or did the founding fathers—who were quite thorough in the design and wording of the documents that are the foundation of the United States as a nation—deliberately not include any mention of an official language out of tolerance for multilingualism? Did they intend for language to be a right, a freedom like speech and religion, a personal liberty and matter of individual choice? Did they mean for it to be a state's right? Whatever the reason, in the United States language is not centrally regulated and this was done so on purpose. Indeed, as we have seen, the historical record indicates that the question of official language was discussed by the nation's founders and the institution of an official language was an issue that was accidentally overlooked.

The historical record explaining the absence of a national language policy has been detailed. In the next section, this chapter will discuss the growth and diversification of the United States, and present the country's history of enactment of restrictive language policies on conquered peoples. It will discuss how language measures have been enacted in the past and the motives that drove such actions in the absence of an official language.

U.S. Expansion, Americanization, and the Diversification of the United States

The social and cultural contexts of bilingualism are directly related to prevailing social and cultural attitudes toward diversity. Concerns about language diversity would not be an issue today if diversity itself were not. Therefore, understanding the U.S. historical context—how the United States came to be the diverse place it is and knowing the mechanisms by which different population groups came to be incorporated into the United States—is critical for understanding the social and cultural contexts of bilingualism today (see Table 10.1 for a timeline of important historical events).

The United States' expansion westward during the nineteenth century was driven in large part by the doctrine of *Manifest Destiny.* Manifest Destiny was the nineteenth century belief that America was created to be expanded, and that the United States had a divine mission to expand across the continent of North America toward the Pacific Ocean. The idea, which means obvious or undeniable fate, was never a specific policy. Rather, it was an ideology that combined elements of American nationalism, expansionism, and *exceptionalism* (the belief that the nation is exceptional and does not conform to any pattern or norm). The doctrine professed the cultural and racial superiority of White Europeans, and often characterized White people as "God's chosen" who were destined and required by divine providence to overcome and *Americanize* uncivilized, non-European peoples, meaning to make them "American" in culture.

Table 10.1 Important Historical Events

1795	U.S. Congress rejects first language bill. Bill would have allowed the government to print all laws in English and German
	U.S. Congress approves a second language bill that is signed by George Washington. Bill requires all federal statutes to be published in English only
1879	Carlisle Indian School, first of the "Indian Boarding Schools," founded in Pennsylvania
1846	*Mexican-American War*. Ends with the signing of the Treaty of Guadalupe 1848 Hidalgo
1898	*Spanish-American War*. Puerto Rico becomes a U.S. territory
1901	*Foraker Act*. Formally establishes the territorial relationship between the United States and Puerto Rico
1902	United States declares both English and Spanish the official languages of Puerto Rico, and imposes English as the language of instruction in Puerto Rican schools
1909	*Olmstead Act*. Gives the U.S. president a direct role in Puerto Rican affairs.
1916	English language requirement for Puerto Rican schools relaxed to allow for use of Spanish in classroom instruction in lower elementary grades
1917	*Jones Act* grants Puerto Ricans U.S. citizenship. Puerto Rico officially becomes an unincorporated U.S. territory
1930	English language requirement for Puerto Rican schools ends
1952	Puerto Rico becomes a commonwealth
1991	Spanish becomes the official language in Puerto Rico, and the official language of instruction in Puerto Rican schools

During the 1840s, Manifest Destiny was used to justify and advance the U.S. desire to appropriate North America and displace non-European peoples. Westward *expansion* entailed the acquisition of land and the exclusion and oppression of non-European peoples, prompting conflict with Native Americans and the sovereign nation of Mexico. As the United States pushed westward, the "Indian Wars" resulted. Native peoples were displaced as their land was taken by settlers and by military force through forcible "Indian Removal." *Mexicanos*, *Tejanos*, and *Californios* in what today is the U.S. Southwest were squeezed by settlers and eventually incorporated into the United States when their land was annexed by the United States after Mexico lost the Mexican American War.

Language *assimilation* as part of cultural assimilation was a strategy employed in the conquest of the Americas and the U.S. annexation of land. Arguably, one of the most effective ways to exterminate a people is to destroy their culture by robbing them of their language. In the l880s, the U.S. government established the Indian boarding schools as part of its explicit federal policy to assimilate Native Peoples into the dominant Anglo-American culture. This essentially called for the extermination of Native American cultures through the forced integration and Anglicization of

Native peoples (Spolsky, 2004, p. 94). The intention of the Indian boarding schools was to replace traditional Native American life-ways, like culture, language and religion, with those sanctioned by the U.S. government. One of the first, and most notorious, schools established was the Carlisle Indian School in Pennsylvania, founded in 1879 by Captain Richard Henry Pratt, an *assimilationist* who professed the superiority of White people and the inferiority of Native Peoples. From the 1880s through the 1920s, federal Indian education policy called for the forcible removal of Native American children from their families and people and enrollment at a U.S. government-run boarding school. The policy-makers argued that by eliminating exposure to Indian peoples and culture, and by immersion in American "cultural norms" through an American education, the Indians could become "civilized" just like any other (White) American. However, it is doubtful that the oppression of Native Americans was solely an issue of culture. It seems obvious that the oppression of Native Peoples was, and continues to be, as much about race/ethnicity as it was about culture. For example, it is unlikely that the "civilizing" of Native Peoples would ever result in their being perceived or categorized as Americans, a designation that is arguably reserved for Whites only. The fact that Native Americans, like other hyphenated Americans, are not just "American" makes the point.

Clearly, mastery of English was considered a primary requirement for assimilation into American culture and society. Perhaps the Commissioner of Indian Affairs, T. J. Morgan, captures the sentiment of the times and the guiding beliefs underlying the establishment of the boarding schools best when he described English as "the language of the greatest, most powerful and enterprising nationalities beneath the sun" (Marr, n.d.). Clearly, the establishment of the Indian boarding schools was based in part, if not entirely, on the belief that Native American cultures and life-ways—such as their languages—were inferior to those of Whites. In keeping with this attitude, bilingualism, or the maintenance of native languages, was explicitly prohibited at the boarding schools, and children caught "speaking Indian" were harshly punished. Similarly, this is also what a lot of Mexican-Americans/Chicanos reported as they attended public schools in California and throughout the Southwest.

The belief in *Manifest Destiny* that encouraged the conquest and *Americanization* of Native Peoples also prompted the Mexican-American War (1846–1848). In 1845, President James Polk announced to the U.S. Congress that the country should strictly enforce the Monroe Doctrine[3] and aggressively expand into the West. Mexicans, in what became the U.S. Southwest, were involuntarily incorporated into the United States after the Mexican-American War. The two-year war ended with the (controversial and disputed) signing of the Treaty of Guadalupe Hidalgo, which necessitated that Mexico sell almost half its land to the United States (this includes what today is Texas, New Mexico, Arizona, California, Nevada, Utah, most of Colorado, and some small parts of Kansas, Oklahoma and Wyoming; Schmidt, 2000, p. 102). Mexicans living in the newly acquired land had, in theory, the "choice" to stay in the United States or return to Mexico. Those who "chose" to stay in the United States were granted U.S. citizenship. However, in spite of the fact that Mexicans living in the U.S. Southwest were granted citizenship, they were not allowed to vote. Voting rights were denied legally and through restrictive property laws, language and literacy requirements, as well as through widespread intimidation and violence (Ricento, 1995).

As a former Spanish colony, and with a huge indigenous population, the newly American *Mexicanos* were not English speaking. They spoke Spanish and the United States chose to incorporate those Spanish speaking people into the United States. Similar to Native Americans, when *Mexicanos* became part of the United States, English was imposed as the language of instruction in schools. Children were not allowed to speak Spanish in school. Like Native Americans, language was a primary tool used to try and *Americanize* Mexicans. Spanish-speaking Mexican children were

schooled to behave and act "civilized" like White Americans, which entailed learning English. As Texas Governor (1915–1927) James Ferguson so eloquently put it (with reference to Spanish being taught in Texas public schools): "If English was good enough for Jesus Christ, it ought to be good enough for the children of Texas" (circa 1924).[4] In spite of U.S. efforts to Americanize Mexican peoples, the impact of Mexican culture on the United States, as evident in the Southwest today, was and is profound. As a result of the annexation of this vast Mexican, Spanish-speaking area, the U.S. Southwest was infused with and, to some degree, culturally determined by, its non-White-Anglo-Saxon-Protestant, non-English speaking cultures. To this day, the U.S. Southwest has the highest concentration of Spanish speakers, the highest concentration of non-English speakers, and the highest concentration of Mexicans and other Latinos in the United States (Mexican-origin people are the largest Latino national group in the United States, and comprise almost 60% of the Latino population [Ramirez, 2004]). In part due to this, the United States is one of the largest Spanish speaking countries in the world. In fact, Los Angeles, California is the second largest Spanish-speaking city in the world after Mexico City!

Similar to much of Mexico, the island of Puerto Rico became a U.S. territory after military conflict, when it was ceded to the United States after its victory in the Spanish-American War of 1898. The War ended with the signing of a peace treaty between the United States and Spain, under which the United States gained control of Puerto Rico. The Foraker Act of 1901 formally established the territorial relationship between Puerto Rico and the United States, and many of its provisions still hold to this day. In 1909, the Olmstead Act gave the U.S. president a direct role in Puerto Rican affairs. It wasn't until the Jones Act of 1917 that Puerto Ricans were granted U.S. citizenship and Puerto Rico officially became an unincorporated U.S. territory. In 1952 Puerto Rico became a commonwealth with its own legislature and constitution, and the island was granted its own internal self-government.

When the United States gained control of Puerto Rico, the country was a Spanish-speaking country, as it is today. In 1902, the United States declared both English and Spanish the island's official languages and imposed English as the language of instruction in the schools, reflecting a consistency of policy of incorporation through public school instruction in English. Upon arrival, the United States determined that Spanish language Puerto Rican schools were in need of English language reform, and declared English "The official language of school reform throughout the island" (Crawford, 2000, p. 17). As was the case with Native Americans and Mexicans in the Southwest, language was used as a tool by the government to *Americanize* Puerto Ricans.

President Theodore Roosevelt firmly believed that immigrants and newly incorporated Americans had to become English speakers and adopt Anglo-American cultural ways to become American. Roosevelt understood that the schools were a powerful tool through which the U.S. colonial mission in Puerto Rico could be carried out, and consequently was a staunch advocate of English instruction in the schools. In 1937, after 38 years under U.S. control, President Roosevelt appointed a new education commission for the island with the purpose of intensifying English instruction in the schools (Crawford, 2000). Roosevelt found it "regrettable" that "hundreds of thousands of Puerto Ricans have little and often virtually no knowledge of the English language . . . Only through the acquisition of this language will Puerto Rican Americans secure a better understanding of American ideals and principles" (Crawford, 2000, p. 18). This statement clearly illustrates the prevailing sentiment at the time that becoming American meant learning English because it was within language, at least in part, that fundamental American principles were located—a model that was different from that of many of the founders who believed American citizenship and identity was a function of shared beliefs in democratic principles and not a common language and culture.

Although the language requirements in Puerto Rican schools were relaxed somewhat in 1916 to allow for use of the native language in classroom instruction in the lower elementary grades, the United States imposed English as the language of instruction in the schools until 1930. It wasn't until almost 100 years after the United States gained control of the Spanish speaking island that Spanish once again became the island's official language in 1991. At that time, Spanish became the official language of instruction in the schools.

So what does it mean to be an American, and what did that mean for new peoples becoming Americans? As we have seen, language is a powerful tool and marker of identity, and there is an intimate relationship between power, notions of cultural superiority, and language. As the examples of Native Americans, Mexicans, and Puerto Ricans illustrate, as the country was forming, language was used as a tool to incorporate new Americans and Americanize them as the country expanded. American identity was widely believed to be a function of culture of which a common language was a fundamental component. Furthermore, becoming American meant acting civilized—meaning like White Americans, which entailed learning English. Hence, English language skills were understood as a requirement for entrance and participation in U.S. society because becoming American necessitated adopting American culture and values which could, perhaps only, be found in language—not just proficiency in English, but rather English monolingualism as a result of cultural coercion and forced sociocultural and linguistic assimilation resulting in loss of the native language. Language assimilation was "piggy-backed" to cultural *assimilation*, and language policies at various levels of government were enacted to further that belief. The language policies that were adopted functioned effectively as a form of social engineering, as the policies were designed to effect conformity, produce sociocultural homogeneity and linguistic uniformity through assimilation and Anglo-American enculturation, although not necessarily integration (the proposition that integration can result from segregation and exclusion is arguably nonsensical). The prevailing belief was that only through English could American ideals and values be understood. This was a sharp departure from the ideas of some of the founders who believed that American identity was rooted in shared principles and values, and not a common language and culture; as the twentieth century unfolded, these widely held beliefs only became more prominent.

How the United States enacted restrictive language policies on conquered peoples has been detailed. In addition to the involuntary incorporation of conquered people, immigration has played an equally important, if not greater role, in making the United States into the diverse country it is. In the next section, European immigration at the turn of the twentieth century will be presented. As shall be discussed, how Native Peoples, Mexicans, and Puerto Ricans were treated foreshadowed how this caused a widespread anti-immigrant backlash and the enactment of various anti-immigration and restrictive language policies.

Immigration, Language Diversity, and the U.S. Response

Since the founding of this country to the present day, views toward diversity, language, and bilingualism among the U.S. population, as reflected in various official and unofficial government policies, have fluctuated and varied. They have moved from being tolerant and accepting, to resentful and intolerant. This dynamic has largely been dependent on who—racially/ethnically, culturally, nationally—the speakers of a language were, and has been tied to immigration trends. Language has also been closely tied to (actual and perceived) citizenship and immigrant status, which is

highly correlated with prevailing notions of American identity. It is a dynamic that historically has been about power and notions of cultural superiority.

In the beginning, bilingualism among Americans and European immigrants was mostly appreciated, and non-English languages were protected and socially and politically encouraged until the late nineteenth century (Fitzgerald, 1993, p. 37). However, this changed with the increase in immigration in the late 1800s. Germans were one of the first immigrant groups to be the targets of anti-immigrant sentiments in colonial Pennsylvania (Crawford, 2000). At the time, German immigration was high and they were settling in large numbers in Pennsylvania. As the German population grew and adopted a noticeable presence, concerns about English language displacement began to emerge as they began to be perceived as a threat to the sociocultural and political integrity of the country. As none other than Benjamin Franklin said: "Unless the stream of their importation could be turned from this to other Colonies . . . they will soon so out number us, that all the advantages we have will not in My Opinion be able to preserve our language, and even our Government will become precarious" (Franklin, *The papers of Benjamin Franklin,* [as cited in Crawford, 2000, p. 11]). And as he went on to conclude in *Observations Concerning the Increase of Mankind,* Franklin said:

> [W]hy should the Palatine Boors be suffered to swarm into our Settlements, and by herding together, establish their Language and Manners, to the Exclusion of ours? Why should Pennsylvania, founded by the English, become a colony of *Aliens*, who will shortly be so numerous as to Germanize us instead of our Anglifying them, and will never adopt our Language or Customs, any more than they can acquire our Complexion. (as cited in Crawford, 2000, p. 11, emphasis in original)

The hostile and exclusionary tones of these remarks are poignantly obvious. They also foreshadow the *nativist* attitudes (meaning to favor the interests of established inhabitants over those of immigrants) that would come to mark the United States in the late 1800s and well into the twentieth century. It clearly illustrates the fear that accompanied the increase among one national and linguistic group in particular, and exemplifies notions of White-Anglo-Saxon-Protestant cultural superiority. These sentiments have historically greeted whoever has been considered a non-White-Anglo-Saxon-Protestant group, especially as they begin to establish a presence in the United States, and as a measure by which to exclude their access to resources and power.

The diversity of the United States and its ongoing struggle with language issues is evident in past state-level language policies. Like education, language policy has primarily been a function of state and local governments and the development and implementation of language policies within their purview. During the 1800s, many states were officially bilingual in the sense that they had a "Statutory or constitutional recognition of languages other than English" (Perea, 1992, p. 589): Pennsylvania in English and German, California and New Mexico in Spanish and English, and Louisiana in French and English (Perea, 1992). During that time, there were also movements in Ohio to recognize German as the official language (Spolsky, 2004, p. 94).

When the Louisiana Territory was purchased in 1803, Native Americans and non-English speaking Europeans, mostly French, became part of the United States along with the land. It was a huge territory where English was not the dominant language. As a result, shortly after the purchase all federal laws applicable to the Louisiana Territory were printed in English and French. Interestingly, according to Schildkraut (2005), Louisiana was the first state to declare an English language requirement in 1812 (Schildkraut, 2005, p. 14).[5] However, it was not an English-only

law and French continued to be used in state government. Louisiana's 1845 Constitution guaranteed a bilingual legislature (Crawford, 2000, p. 13). However, the republican constitutions imposed by Union troops after the Civil War in 1864 and 1868 terminated French language rights as punishment for their support of the Confederacy (Crawford 2000). But this was reversed about a decade later at the end of Reconstruction, when the Constitution of 1879 restored the legal status of French, although to a lesser degree than before, which remained in effect until 1921 (Kloss, *The American bilingual tradition* [1998, also as cited in Crawford, 2000, p. 13]). With the exception of Louisiana, however, there was little state-level action on the issue of language until 1920 when Nebraska amended its constitution and made English the official language (Schildkraut, 2005, p. 14).

The early examples of state-level efforts to "deal with" the issue of language diversity foreshadowed the problems that were looming on the horizon as immigration began to increase in the late 1800s. The nineteenth and early twentieth century saw high numbers of immigrants, primarily from Europe, arrive in the United States during the great wave of European immigration between 1880 and 1920. However, during this peak in immigration, immigrants shifted from northern European to primarily southern and eastern European origin. Unlike Native Americans, Mexicans, Puerto Ricans, and African origin peoples, in the beginning, European immigrants were shown more tolerance with regard to native language use. The difference in treatment was tied to sociocultural perceptions of who belongs, who can be "American," and who is defined as "Other" by mainstream U.S. society, as determined by of different points of origin as manifest in non-northern European racial/ethnic phenotological features and cultural characteristics. It is this designation as Other that resulted in different racial/ethnic, cultural, and national groups receiving different treatment with regard to native language use. The case of bilingual education helps to illustrate this point.

Until the late 1800s, bilingual education among European immigrants was fairly common, as was school instruction solely in the native language. For example, Germans set up schools where instruction was both in German as well as bilingual in both English and German (Crawford, 1999; Fitzgerald, 1993; Hakuta, 1986). In 1839, Ohio became the first of many states to allow bilingual German-English instruction. A few years later in 1847 Louisiana passed a law allowing bilingual instruction in public schools (Crawford, 2000). The practice was followed by other immigrant groups, Italians and Greeks, among others, who also incorporated instruction in their native languages in their schools, with and without state authorization (Crawford, 2000).

Although bilingual instruction was prevalent, once non-English speakers began to grow in numbers and have a noticeable presence, language became an issue of concern. When non-northern European immigration peaked, efforts to restrict native language use and institute English-only laws emerged across the country. Not coincidentally, support for native language instruction in the schools plummeted with the increase in the number of immigrants. Beginning in the 1880s, some states passed laws preventing instruction in any language other than English, particularly German. With increased immigration and the emergence of anti-German sentiments during and after World War I, paranoia and *xenophobia* (fear of foreigners and what is perceived as foreign) swept the nation along with a strong sense of patriotism. Coupled with a national desire to do away with any allegiance to a foreign state, there was a new emphasis placed on learning English and doing away with foreign languages. Theodore Roosevelt (U.S. President 1901–1909) believed that English was an integral part of what it meant to be an American, and if immigrants spoke a "foreign" language, they would be divided in loyalty. He proposed setting up schools for immigrants, and sending them back to their native country if in five years they had not learned English (Spolsky, 2004). Thirty states passed laws mandating that persons who could not speak English

had to attend evening school (Spolsky, 2004, p. 95). By 1923, thirty-four states had banned native language instruction and made English the only language of instruction in the public schools and in some cases private schools as well. However, in 1923 the Supreme Court ruled in *Meyer v. Nebraska* that state laws banning native language instruction in school violated the due process clause and found such laws unconstitutional. It was the first case regarding language rights ever heard by the Supreme Court. However, the damage had been done and the *xenophobia* of the 1920s was already firmly entrenched. Perhaps Theodore Roosevelt captured the prevailing attitude of the times best when he declared: "There can be no divided allegiance here . . . We have room for but one language here, and that is the English language, and we intend to see that the crucible turns our people out as Americans."

The paranoia and *xenophobia* that consumed the United States during the early part of the twentieth century emerged during a period of high immigration from countries that until that point had not traditionally been the sources of new immigrants to the states. They were not Anglo-Saxon or Protestant and, at the time, those from southern and eastern Europe were not even considered White.[6] These "new immigrants" did not come from northern Europe and did not have northern European cultural traditions. They were different, and fear of differences as a threat to the dominant culture and way of life is what drove the country to implement anti-immigrant policies and the restrictive language policies that came along with them. In fact, it was through language policies that anti-immigrant policies were put into effect and efforts to exclude immigrants and disenfranchise "non-American" ethnic/racial and cultural groups were implemented.

The presence of racial/ethnic, cultural, and linguistic minorities, and the increase among languages other than English, came to be regarded as a danger to the wellbeing of the nation. Consequently, English language requirements for naturalization were enacted with The Nationality Act of 1906, which required immigrants to speak English in order to be naturalized as citizens. It was the first piece of federal legislation imposing any kind of language requirement on residents or prospective citizens. It remains in effect today. The policy was intended to "Improve the 'quality' of naturalized citizens" (Perea, 1992, p. 568). As the Commissioner of Naturalization in 1905 poignantly articulated the widespread view: "The proposition is incontrovertible that no man is a desirable citizen of the United States who does not know the English language" (as cited in Perea, 1992, p. 568). The purpose of the language requirement was to exclude the number of people whose cultures and ethnicities differed from the White American mainstream cultural majority, and demonstrates how language was used as a proxy for race/ethnicity and culture with the purpose of excluding immigrants based on national origin. It is a policy of tremendous symbolic importance. The policy demonstrates a culturally specific federal policy that equates the English language with being American, as it is through the naturalization process and applicable laws that the criteria for admission to American society are established (Perea, 1992).

During the early twentieth century, the prevailing belief was not only that bilingualism was of no social value, but that non-English languages were socially damaging, encouraged separatism, were indicative of allegiance to a foreign state, and even came to be associated with low intelligence and a lack of patriotism (Fitzgerald, 1993; Hakuta, 1986; Spolsky, 2004). Historically, *hereditarian* views of bilingualism and bilinguals (an advance of the theory that individual differences among people can be primarily explained by genetics) were rooted in a deficit model of the genetic and cultural inferiority of bilingual people and non-English speakers. Bilingualism was thought to be the cause of low intelligence as it was thought to result from low intelligence—"a catch 22." Notably, this prevailing idea was popular among scientists, elected officials, and the public during a period of high immigration from non-Western European countries (Hakuta, 1986). Even today, in the twenty-first century, this kind of thinking persists. *The deficit model of bilingualism* endures

in the controversy surrounding the education of language minority students and is evident in the criticism voiced from those opposed to so-called bilingual education, in particular popular allegations that if a non-English speaking student is performing poorly in school it must be because s/he is being taught in two languages, if not just proficiency in or a preference for a language other than English, notably Spanish.

These widely held beliefs were driven by the fear of the times. Between 1910 and 1950, more than 1,000 people were incarcerated for "subversive speech" and thousands of cases were brought to trial citing use of a non-English language as a "clear and present danger" (Fitzgerald, 1993, p. 39; Trueba, 1989). The United States had entered a heightened period of isolationism and *xenophobia*, and immigrants and those not of northern European ancestry were going to bear the brunt. It was one example of one of many periods in U.S. history when culture, race/ethnicity and language were collectively used to disenfranchise and exclude large numbers of people from the American mainstream or prevent them from entering the United States at all. It demonstrates how language was a convenient symbol under which racial, ethnic, and cultural discrimination could be carried out.

With anti-immigrant attitudes peaking, immigrant quotas were adopted in the 1920s. Because mass immigration resumed after World War I, the U.S. government adopted the national origins quota system. The immigration acts of 1921 and 1924 limited immigration by assigning each nationality a quota. The goal of the policy was not just to increase the number of immigrants, but to give priority to Northern European immigrants who were believed to be more "suitable" and easier to assimilate (Spolsky, 2004, p. 102). The quotas had the desired effect of stemming the flow of immigrants and the number of non-English speaking people to the United States. In 1952 the Immigration and Nationality Act (INA) brought under one comprehensive statute all the multiple laws that had governed immigration and naturalization until that point. Although it perpetuated the already existing immigration statutes and did not abolish the quota system, it did, among other important modifications, eliminate race as a bar to immigration and naturalization. The changes can be called progressive because they lifted racial barriers to immigration and, technically, eliminated blatant race-based criteria for admission to the United States. However, such progress was limited as the changes left, intentionally or not, cultural/ethnic barriers in place by not lifting the national origin quotas. Such policies appear as racially neutral, however culture and ethnicity have historically functioned as proxies for race, thus in practice, leaving the quotas in place had the effect of a race-based policy without being racist on its face.

But monumental sociopolitical changes were on the horizon. The Civil Rights Movement brought racial and social justice issues to the fore during the 1960s. During the struggle for social change, the INA was amended in 1965 and the national origins quota system repealed. The changes to the INA marked a shift within the federal government and the attitudes of the nation as a whole. The changes illustrate the power of political will when driven by profound and widespread sociocultural change and public demands to correct historic and deeply entrenched injustices and protect minority rights. The change was the most extensive revision of immigration policy since the 1920s. Most importantly, it replaced the quota system with a system based primarily on family reunification and the intent of attracting immigrants with needed skills to the United States. It is a system that exists to this day and which, in part, opened the door for the massive demographic changes taking place in the United States today—changes which, decades later, would bring language issues to the forefront of public discourse and result in efforts to implement the same kinds of restrictive language policies witnessed in the past.

In the following sections, immigration since 1965 will be discussed. In particular, the demographic changes taking place in the United States at the turn of the twenty-first century, notably the

growth among the language minority population, will be presented. Because population change today is largely driven by high immigration from Latin America, a case study of the Latino population in the United States will be presented. The large and steadily growing Latino population presents numerous important policy issues, among them questions about language and bilingualism. The pros and cons of Spanish-English bilingualism and English or Spanish monolingualism will be presented. Increased immigration, specifically growth among the Latino population, has triggered anti-Latino immigrant fears similar to those that accompanied European immigration in the past. These issues will be discussed in the following sections as well.

The Post-1965 Immigration

The dramatic demographic changes unfolding in the United States today are perhaps the defining issue of the present times as they are impacting every U.S. social, political, and economic institution. There has been an explosion in the immigrant population since the 1960s, but especially since the 1980s.

Population Change in the United States Today

The 2002 Current Population Survey (CPS) revealed that there were 33.1 million immigrants living in the United States. This figure does not include an unknown number of undocumented immigrants, estimated to be between 7 and 12 million (Tarpinian, 2001). The number of immigrants currently living in the United States is unprecedented. According to the 2002 CPS, immigrants accounted for 11.5% of the total population—the highest percentage in 70 years. This figure is three times the level in 1970 and two times the previous peak in the 1930s (Capps, Fix, & Passel, 2002). During the early twentieth century, the number of immigrants living in the United States was only 40% of what it is today (13.5 million in 1910; Camarota, 2002). The 1990s in particular were marked by a dramatic rise in immigration. Forty-four percent of today's immigrants arrived in the United States during the 1990s, after a growth of 40% in the foreign-born[7] population during the 1980s alone. Over 13 million people entered the United States during the decade—more than a million people per year (Capps, Fix, & Passel, 2002). During the 1990s the foreign-born population increased by more than 50%, from 7.9% in 1990 to 11.1 % in 2000, of whom 40.3% were naturalized U.S. citizens. Population projections estimate that by 2010 the immigrant share of the total population will surpass the all-time high of 14.8% reached in 1890.

The recent population changes in the United States have been primarily driven by the dramatic increase in immigration from Latin America, and to a lesser degree from Asia. In 2000, immigrants from Latin America accounted for 52% of the foreign-born population in the United States, Asian immigrants accounted for 26% and those from Europe 16%. More than half of U.S. population growth today is among Latinos and Asians. Remarkably, in 1980 Latinos and Asians together accounted for only 8% of the U.S. population (Kolankiewicz, 2000). Demographic projections predict that over the course of the next 50 years, the racial/ethnic, cultural, and linguistic diversity of the country will continue to expand significantly. Both Latinos and Asians are expected to triple. In startling contrast, through 2050 the White population, currently the majority, is projected to grow more slowly than all other racial and ethnic groups, and is expected to cease to be a majority shortly after 2050. They are expected to continue to shrink after 2100. Between 2000 and 2100 the Latino population is expected to jump to 32% and continue to grow,

and Asians will increase from 4% of the total population in 2000 to 13%. Blacks are expected to grow from 13% to 15%.

Immigration has become the determining factor in U.S. population change, as overall population growth across the United States in the 1990s was largely driven by an increase in the foreign-born population and a relative decrease in the growth of the native population. The immigrant population in 14 states grew by more than 20%, and immigration accounted for more than a quarter of total population growth in 20 states during the 1990s (Tarpinian, 2001). Interestingly, the immigrant population in the South experienced the most rapid growth (Malone, Baluja, Costanzo, & Davis, 2003), but it was particularly high in the Midwest and Rocky Mountain regions as well. For example, growth in the foreign-born population accounted for 107% of population growth in North Dakota (Tarpinian, 2001). In many southern, Midwestern, and mountain states, the immigrant population more than doubled during the 1990s (Capps, Fix, & Passel, 2002). As these figures indicate, immigrants today are settling in large numbers in states that historically have not attracted large numbers of immigrants. They are not overwhelmingly immigrating to the so-called traditional gateway states, like California, Texas, New York, and Florida, which have historically attracted immigrants. Immigration has increased the most in nontraditional immigrant states and has grown there by a higher percentage than in states like New York and Florida. For example, during the 1990s North Carolina saw an increase of 274% in the foreign born population, Georgia 233%, and Nevada 202% (Malone et al., 2003), whereas New York's foreign-born population increased by 32%t and California's by 33% (Tarpinian, 2001). Nevertheless, more than half of the foreign born lived in California, New York, and Texas in 2000 (Malone et al., 2003). However, traditional immigrant gateway states like Massachusetts, New York, and New Jersey would not have had overall population growth if it weren't for increases in their immigrant populations (Tarpinian, 2001).

Immigrants are settling all over the country and in areas that historically have attracted few immigrants. This dynamic raises critical questions about how to best integrate new immigrants, and puts a new spin on key policy issues, such as language policy, as states that were more or less predominantly White, non-Latino, or culturally, racially/ethnically static, if not homogeneous, for decades are becoming more diverse. According to the U.S. Census Bureau, there are now five states—California, New Mexico, Texas, Hawaii and Washington—where the majority of residents are some race/ethnicity other than White, non-Latino. The Census Bureau predicts that five other states could make that shift by 2010, and projects that before too long, more than one third of people in the United States will live in majority-minority states. This is the context upon which attitudes and policies about bilingualism are projected and presently enacted. The implications are that issues that were once the concern of a certain few states, are now of national concern. Such is the case with language policy as increased immigration has resulted in tremendous growth among language minorities.

Growth among Language Minorities

The increase in immigration has resulted in the growth of language minority groups and the presence of languages other than English in the United States. Whereas the U.S. population age five and over grew by one quarter between 1980 and 2000, the number who spoke a language other than English more than doubled (Shin & Bruno, 2003). This means that the growth of the number of people who speak a language other than English is exceeding the rate of total U.S. population

growth. According to Grimes and Grimes (2000), there are approximately 336 languages spoken in the United States, of which 176 are indigenous languages—the difference therefore being languages that were brought to the United States by people from other countries.

According to the 2000 Census, 47 million people or 17.6%t of the U.S. population over age five spoke a language other than English. This figure grew from 13.8% in 1990 and 11% in 1980. The number of people who spoke a language other than English grew by 38% in the 1980s and 47% in the 1990s. The 1980s brought a growth of 38% in speakers of minority languages, and 37% in U.S. residents who have some difficulty with English. The U.S. Census Bureau reports that the number of people in the United States who speak English less than very well or not at all has increased 65% since 1990 as immigration rates have risen. Furthermore, the 2000 Census revealed that approximately 11.9 million households are linguistically isolated.[8] Of the 47 million people who spoke a language other than English in 2000, 13.8% spoke English less than very well. In addition, the 2000 Census also found many of these people were at least bilingual, as 55% reported speaking English very well. However, the proportion of people who speak English less than very well has steadily grown from 4.8% in 1980, to 6.1% in 1990, to 8.1% in 2000. Nevertheless, the United States is clearly not a monolingual country, and it is safe to infer that the number of bilinguals and multilinguals has grown substantially over the last 20 years and will continue to grow far into the future. Language diversity in the United States is so great that in 2000 the U.S. Census Bureau printed the 2000 Census in six languages: English, Spanish, Korean, Mandarin, Vietnamese, and Tagalog!

The new immigration to the United States is different from previous waves of immigration because it is part of a global trend and is not solely a U.S. phenomenon. Globalization has led to the large-scale migration of people on a global scale, which is driving U.S. population change as well as demographic changes around the world, notably in Europe. People are migrating primarily for economic reasons and are moving from rural areas and developing countries to cities and developed countries on a scale like never before. Because the United States is in such close proximity to so many Latin American countries, and because of the political and economic relationship between the United States and Latin America, the new immigration is primarily from within the hemisphere. Some people believe that immigration from Latin American, specifically Mexico, is a move to take back the land that was taken from Mexico after the United States-Mexico War. Furthermore, some people, both Mexican/Mexican-American as well as those who are not, and both those who are opposed to and supportive of immigration, feel Mexicans are returning to Aztlan, the lost land of the Aztecs in the lost territories of the U.S. Southwest, that may or may not exist and which some say is somewhere in Utah. This, however, is highly contested and a matter of opinion. Nevertheless, Latin American immigration is having a tremendous sociocultural impact on the United States, and Latinos will fundamentally shape the future of the nation.

Case Study: Latin American Immigration

Immigration from Latin America and the consequent growth of the Latino population has had a profound impact on the U.S. population. The 2002 CPS measured 37.4 million Latinos or 13.3% of the total U.S. population, up from 12.5% two years earlier as measured by the 2000 Census. Latinos experienced a growth rate of 61% since 1990, growing significantly faster than the total U.S. population, which grew by only 13% during the 1990s. In 2000 they became the largest minority group in the United States, surpassing African Americans. The Latino population is projected to increase rapidly through 2025, accounting for 44% of the growth in the nation's

population. In 2050 Latinos are expected to account for about one quarter of the U.S. population. Latinos are and will remain the largest ethnic, linguistic, and minority group in the United States well into the future.

It is important to reiterate that not all Latinos are immigrants. In 2000, 60% of Latinos were born in the United States—meaning that the majority of Latinos are not immigrants—40% were foreign-born, and about 7 out of 10 were either native born or naturalized citizens, compared to 9 out of 10 people for the rest of the population (Ramirez, 2004). Furthermore, Latinos have lived within the borders of the United States since before its inception. To refer to all Latinos as immigrants is not just inaccurate, but absurd. It is important to understand that, in particular, many Mexican origin peoples in the Southwest and California are not immigrants; they are U.S. citizens by birth and the descendants of people who lived within the borders of the United States since before the nation existed. Furthermore, migrant laborers today, the majority of whom are Mexican, are following migratory lines that have existed for generations and which transcend political borders (some would say they are coming back to Aztlan). Puerto Ricans are not immigrants either. Puerto Rico is a U.S. territory and Puerto Ricans are U.S. citizens, and those who come to live in the continental United States are migrants, not immigrants. The difference being that immigrants are people who leave one country to settle permanently in another, whereas migrants are people who move back-and-forth or between one region or country, such as Latin American migrant laborers who move back-and-forth between the United States and their native countries for work, and Puerto Ricans who move from one part of the United States to another.

Nevertheless, the increase among recent Latino immigrants has created new pressures, since more than three quarters of them speak Spanish and a large number are monolingual Spanish speakers (it is important to note that not all Latinos speak Spanish, though; see section *Concerns Regarding Bilingualism and the Social and Cultural Integration of Latinos* in this chapter). The United States has a huge Spanish-speaking population. In 2000, of the 47 million people who spoke a language other than English, 59.8% (28.1 million people) spoke Spanish. In 2000, over 75% of Latinos spoke a language other than English, and 99% of them spoke Spanish. Among Latinos, about 51% were bilingual and spoke English very well; however, 40.6% spoke English less than very well compared to 8.1% among the total population. The number of bilingual and monolingual Spanish speakers has grown substantially over the last 20 years and this trend will continue for years to come.

The influence of the Spanish language in the Americas and its impact on the United States cannot be underestimated. President Thomas Jefferson, who spoke five languages, offered some advice in the eighteenth century that is highly relevant today: "Bestow great care on the study of Spanish and endeavor to learn it, for in that language is written the history of the hemisphere." More than 200 years later, Spanish is the most widely spoken language in the United States after English, and the United States is the fifth largest Spanish-speaking country in the world, after Mexico, Spain, Argentina, and Colombia, and has the fourth largest Spanish-speaking population in the Americas.

As the U.S. Latino population has grown, the debate surrounding bilingualism has become more intense. For a country with high levels of immigration, it is questionable if *assimilationist* language policies are appropriate and effective for integrating such a large percentage of the population that primarily speaks one language—namely, Spanish. High immigration and the fluid, transnational dynamics it has created have cast doubt on the efficacy of political borders, and has arguably made their relevance questionable. People are blending, moving back and forth, in many ways resulting in an arbitrary and ambiguous borderland—neither here nor there, but both, or as it is nicely put in Spanish*, ni aquí, ni allá.* Such is the case in the U.S. Southwest.

Romaine (2004) argues that the diversity and linguistic realities of the United States reflect changing political boundaries. As a result of various historical factors, bilinguals, and individuals as well as entire populations not conversant or proficient in the dominant mainstream language, have come to be concentrated in regions where use of a language other than the dominant language is the norm (Romaine, 2004). In the United States, the annexation of land necessitated the enclosure of various cultural, ethnic/racial, and linguistic groups within the country's borders. The resulting dynamic of, for example, a high concentration of Spanish speakers within a large swathe of geographic area, illustrates the societal and sometimes legal imposition of the dominant language on those groups, and the efficacy, if not the legitimacy of, the forced incorporation of peoples through assimilationist tactics. In an area where a political border was drawn through a national and linguistic group, it logically follows that such a border area will be linguistically diverse (Romaine, 2004, p. 390). Such is the case with Mexican-origin peoples in the Southwest, Puerto Ricans on the island of Puerto Rico and, to a lesser degree, Native Americans.

Nevertheless, whatever the causes are, the fact remains that the United States has a large and steadily growing Spanish-speaking Latino population. How to best integrate the population into the U.S. mainstream and promote their social, economic, and political participation—not segregation or exclusion—is a fundamental concern for policymakers, elected officials, researchers, the business community, and the general population.

Concerns Regarding Bilingualism and the Social and Cultural Integration of Latinos

The noticeable growth among Latin American immigrants has raised concerns about their ability to acculturate, enter the U.S. mainstream, and become "American." This understandably has raised questions about the ability of these new immigrants to learn English, which is without question the dominant language of the country and is essentially required to "make it" in the United States—but this should not be taken to mean that learning English should come at the expense of losing the native language, and that English monolingualism is what is required to "make it."

Linguists have documented the steady linguistic assimilation of immigrants. Most agree that by the third generation, the native language is lost, as the second and then third generations experience a language shift and become English monolinguals (Hakuta 1986; Rodriguez 2001). However, whether this pattern holds for current immigrants is a subject of debate. Unlike previous waves of immigration, there is a huge Latino migrant population today that moves back and forth between the United States and, primarily, Mexico. For this migratory group, there are clear incentives to learn English, but there are also clear incentives to maintain the native language. Therefore, for this subpopulation, this migratory dynamic could possibly result in subsequent generations not experiencing a language shift to English dominance or monolingualism as rapidly.

There are difficulties in measuring the rate at which today's Latino immigrants acquire English language skills and the rate at which subsequent generations become fluent English speakers or English monolinguals. Measurement may be complicated by there being a fairly steady stream of Spanish-speaking immigrants entering the United States that replenishes new immigrant and Latino ethnic communities. New immigrants could possibly mask the number of persons attaining English proficiency in a particular community or in the Latino population in general, making it appear as if there are fewer individuals learning English than there actually are. However, the steady and high presence of Spanish speakers in Latino communities presents an incentive to maintain the native language, which could possibly negatively impact the need to learn English

if it is not necessary for life and survival. This raises issues of residential segregation and other complex social inequalities that are beyond the scope of this chapter. The important point is that racial/ethnic, immigrant, linguistic, and other minority communities come together as a result of numerous interrelated historical, economic, political, and sociocultural factors. The problems that accompany segregated minority communities are not a function of the concentration of racial minority groups or ethnic enclaves. It is not Blackness any more than it is the Spanish language, but housing discrimination, racism, oppression, socioeconomic marginalization, and a system of de facto segregation that are at the root of our most pervasive social problems and which are deeply entrenched in a vicious cycle of social reproduction (García Coll et al., 1996).

Nevertheless, research suggests that Spanish-speaking immigrants today are learning English as quickly as earlier European immigrants (Rodriguez, 2001). Current research is confirming what linguists have argued for decades: the first generation is monolingual, the second bilingual, and by the third, if they haven't become English monolinguals, then English is the preferred language. Some scholars have even suggested that the speed of Anglo-American assimilation and shift to English language dominance among immigrants is increasing and quickly approaching a two-generation pattern, particularly among Spanish speakers (Rodriguez, 2001; Veltman, 1983, 1988 [as cited in Crawford, 2000. p. 6]). This finding would indicate that while the number of people who speak a language other than English is increasing, linguistic assimilation is on the rise, as well.

The incentives to learn English are many and the evidence suggests that they work. It is doubtful that making English the official language would increase the incentive to learn English (Schildkraut, 2005). In their study of second generation immigrant children in Florida and California, Portes and Rumbaut (2001) found evidence of the same pattern of linguistic assimilation and language shift that the evidence from linguistics suggests. Portes and Rumbaut (2001) found that the children of immigrants learn English quickly, they come to prefer it to their native language, and soon lose fluency in their native language. They found that preference for English was stronger among children born in the United States than among those who immigrated to the United States with their parents. They also found that the generational language shift, one component of the process of *acculturation* (the form of cultural transmission experienced by individuals and groups that results from contact with, and influence from institutions and people that are of a different culture than their own, which leads them to incorporate certain culturally specific and appropriate behaviors into their repertoires [Berry, Poortinga, Segall, & Dasen, 2002, p. 21]), can lead to tension and conflict within families. It would seem important to assure that those people who become English speaking monolinguals do not develop negative attitudes toward bilinguals or Spanish speakers.

Globalization and the advent of the Internet have also brought about the global dominance of English. Coupled with the dominance of English in the United States, the world's only current superpower, English has become the world's common international language. English is the language of the Internet, our global economy, business, technology, and politics. There are overwhelming social and economic incentives, if not a fundamental need, for Spanish-speaking Latino immigrants to learn English to make it in the United States, as well as the world—no one person knows the value of English more than someone who does not speak it. Spanish-speaking Latino immigrants face the challenge of learning English in order to make it, a reality that is intensified by the demands of our globalized economy in our technology-driven information age.

Just as there is a need to learn English, there are clear reasons to learn a second language and become bilingual. In an era of globalization and increased immigration, the value of multilingualism goes without explanation. The ability to effectively communicate cannot be overstated, and

the more languages a person speaks, the more people a person is able to communicate with. The job market advantages of being able to communicate in more than one language are clear. For these reasons, it would seem in the best interest of the nation to build on the strengths and abilities of its new immigrants and for the government to adopt policies that promote bilingualism as an asset.

The economic advantages of bilingualism have been documented. However, as we have seen, because bilingualism is not supported in the United States, its value has not been widely recognized. Nevertheless, there is an economic return to bilingualism and Spanish language skills. In 1999 the Florida Department of Education published a study on Florida's multilingual workforce (Fradd & Boswell, 1999). Using Census data from 1990, an income analysis in states that were strongly impacted by immigration was conducted. The study also looked at 10 metropolitan areas strongly impacted by immigration. The study sought to determine if there were economic incentives for bilingual Latinos across the country. At the state level, the study found that in Florida there was an economic advantage for being a Spanish-English bilingual. In addition, in three metropolitan areas, Miami, Jersey City, and San Antonio, the study found that bilingual Latinos earned more than those who only spoke English. In Miami, Jersey City, and San Francisco, the percentage of bilingual Latinos living below the poverty level was lower than for English monolinguals. The research findings strongly suggest an economic advantage for being bilingual. The study also hints that learning English at the expense of losing the Spanish language may decrease available economic opportunities for Spanish-speaking Latinos. Clearly, any economic advantage is correlated with a demand for Spanish-speaking employees in areas with large Spanish-speaking populations. Nevertheless, the results offer more evidence in favor of bilingualism.

Bilingualism is an asset, not a liability, and there are many reasons why bilingual skills are needed and of such great social value. Nevertheless, there is a stigma associated with being bilingual in the United States. Bilingualism is widely perceived as a transitional period leading up to full (cultural and linguistic) assimilation into English monolingualism (Hakuta, 1986, p. 7). In addition, bilingualism and limited English language skills are frequently associated with low socioeconomic status, poor levels of educational attainment, and undocumented immigrant status (Hakuta, 1986, p. 7). For these reasons, bilinguals are widely perceived as possessing both a linguistic and cultural handicap, instead of a skill. The impact of these attitudes is exacerbated for Spanish speakers who also grapple with the social stigma associated with the Spanish language in and of itself, as well as pervasive racism. There are cultural, social, and political values attached to certain languages, such as English, and not to others, notably Spanish. Although there is little to no evidence of support or enthusiasm for languages other than English in the United States, there is a clear negative association with Spanish and those who speak it.

There is no evidence to suggest that bilingualism or language accommodations slow the acquisition of English language skills or promote cultural and ethnic fragmentation, only anecdotes that have no scientific value. Nevertheless, as we shall see, advocates of restrictive language policies claim that bilingualism and the use of a language other than English encourage cultural and ethnic separatism, and discourages assimilation into the U.S. mainstream. These are claims that have been made throughout U.S. history and which have gained new strength in recent years. Current fears about a linguistic and cultural takeover by Spanish-speaking Latinos are coupled with a *nativist* and racist stance that echoes the *xenophobic* attitudes and beliefs of cultural superiority heard in the past.

Latinos, Language, and Fear

As the impact of the new immigration on U.S. society began to become clear, anti-immigrant sentiments and negative attitudes toward certain ethnic and national groups re-emerged with new found strength in the 1980s. This time, they were targeted at Latinos and Latin Americans. As Crawford (2003) shows, today's English Only/language restriction movement was an outgrowth of the modern anti-immigration movement, as it appeals to similar attitudes and has similar followers. It is worth noting that the anti-immigration movement has the support of eugenicists and White supremacist organizations, although no connection to the English Only movement has been found (Crawford, 2003).

Although language had been an issue in the past, it wasn't until the 1980s that the notion English was endangered and therefore in need of legal protection, surfaced (Crawford, 2000). The English Only movement emerged from a fear that English is threatened because its dominance is being challenged by the growth of other languages, particularly Spanish, as embodied by the increased presence of "other," non-White, "non-American," Spanish-speaking Latinos. The movement seeks to defend what is wrongly perceived as a nationwide cultural shift to other foreign languages and to Spanish in particular. The notion of a linguistic threat and looming linguistic displacement is the product of a perceived cultural threat that has the potential to displace the dominant culture unless "something is done." Proponents of restrictive language laws believe that the Spanish language (and high immigration from Latin America) threatens the sociocultural and political integrity of the United States.

Bilingualism and concerns about language are issues that are closely tied to the Latino population. While the debate over bilingualism and language policy does not pertain only to Latinos, the sheer size of the population in the United States makes it very much a Latino issue. The impact of what is frequently dubbed a Latino population explosion, can be seen everywhere. Arguably, the definition of *American* is changing as aspects of Latino and Latin American cultures are being incorporated into what is popularly thought of as "American culture," just as aspects of Italian, German, French, and Irish culture were incorporated in the past. The fact that Latin American and Latino cultures are having such a profound impact is unsettling to many Americans. Unfortunately, this change has resulted in the widespread misconception that Latinos are "taking over," a view that has largely been driven and inflated by fear of a Latino cultural and linguistic invasion, or *Hispanophobia*. This tension has resulted in a conflict between groups, what has sometimes been dubbed a "culture war." Perhaps Harvard University Professor Samuel Huntington, in his essay *The Hispanic Challenge* (2004), sums it up best:

> The persistent inflow of Hispanic immigrants threatens to divide the United States into two peoples, two cultures and two languages. Unlike past immigrant groups, Mexicans and other Latinos have not assimilated into mainstream U.S. culture, forming instead their own political and linguistic enclaves . . . and rejecting the Anglo-Protestant values that built the American dream. The United States ignores this challenge at its peril (¶ 1).

That concerns about language policy and bilingualism are popularly associated with Latinos and the Spanish language, goes without explanation. Furthermore, there is a clear negative association with Spanish in the United States, as the language is popularly associated with poverty, crime and illegal status. These are stereotypes that exist parallel to stereotypes about Latinos, and are evidenced by the way the language issue is framed as an English/American/U.S. citizen versus Spanish/

Latino (undocumented) immigrant issue, and polarized as an "us versus them" "problem" (see Vega this volume). Additionally, there is a prevalent misconception in the United States that English is "competing" with Spanish. There is no language in the United States today that is as widely spoken as English or which has the potential to replace English as the dominant language in the future, and there is no evidence to support those assertions. Although Spanish is the most widely spoken language in the United States after English, contrary to some beliefs, the Spanish language does not have the potential to overtake English as the dominant language. This widespread fear of the Latinization of America, or the Mexicanization of California or the Southwest (a huge area that used to be Mexico; for further reading see Victor Davis Hanson, *Mexifornia: A state of becoming* [2003]), and the perceived cultural threat from the Spanish language, reflect the *xenophobic* and *nativist* attitudes that have fueled and continue to fuel the English Only movement. John Tanton, cofounder of U.S. English (see section *English Only movement and English-only laws* in this chapter), perhaps captured this attitude best:

> In this society, will the present majority peaceably hand over its political power to a group that is simply more fertile? Can *homo contraceptives* compete with *horno progenitivo* if our borders aren't controlled? . . . Perhaps this is the first instance in which those with their pants up are going to be caught by those with their pants down. As whites see their power and control over their lives declining, will they simply go quietly into the night? Or will there be an explosion? . . . We're building in a deadly disunity.

This was from an official, although private, memo Tanton wrote to other members of U.S. English in 1988. Its racist and vulgar tones are obvious and help to draw the connection between the anti-immigration and restrictive language movements. Not surprisingly, when the internal memo was acquired by the media and made public, Tanton promptly stepped down in 1988.

The attitudinal shift toward immigrants, Latinos and language minorities that emerged in the late twentieth century reflects a stark change from the socially progressive attitudes of the 1960s and the early 1970s that sought to empower minorities. Current attitudes toward Latino immigrants and the Spanish language mirror the same concerns about "divided allegiance" expressed by Theodore Roosevelt and echo the *nativist* and racist thoughts of Benjamin Franklin. It is for these reasons that the progress made during the Civil Rights era is especially important in an age when, as we shall see, the rights of language minorities are being threatened and slowly chipped away. Thus, in order to contextualize current efforts to curb language minority rights and understand the impact of restrictive language laws and policies today, it is important to know the rights and protections the federal government offers (and once offered) linguistic minorities. In the following sections, measures taken during the Civil Rights Era to protect the rights of linguistic minorities will be presented, and current language policies and measures to socioculturally integrate language minorities into the U.S. mainstream, will be discussed.

Federal Recognition and Protection of Language Minority Rights

During the 1960s and into the 1970s, monumental social and political achievements were reached to protect the rights of oppressed groups. It was during this period that the U.S. government recognized the civil rights of language minorities and took critical steps to protect those rights (see Table 10.2 for a summary of key protections extended to language minorities during the 1960s

Table 10.2 Federal Protection of Language Minorities from the 1960s and 1970s

1968	The Bilingual Education Act becomes law
1974	*Lau v. Nichols* decided by the U.S. Supreme Court
1975	The 1965 Voting Rights Act amended with Section 203, a temporaryprovision that unless renewed will expire in 2007
2002	Bilingual Education Act Expired

and 1970s). Two of the most notable, and controversial, steps were in the field of education, and another was in the area of voting rights.

The Bilingual Education Act

The Bilingual Education Act expired in 2002. Although it is no longer in effect, it remains an important piece of legislation. In its absence, it helps to illustrate the impact of recent actions impacting language minorities today (section *language laws and policies at the state and local levels* in this chapter).

In 1968 Congress passed the Bilingual Education Act (BEA), or Title VII of the Elementary and Secondary Education Act (ESEA), and the issue has been controversial ever since. Title VII is a legacy of the Great Society initiatives of President Lyndon Johnson, which sought to provide equal economic and educational opportunities for oppressed groups—civil rights issues that were brought to the forefront of U.S. popular discourse during the Civil Rights Movement of the 1960s and which gave rise to the Great Society. From its inception, bilingual education has been about rights: "From the outset, then, bilingual education was justified as a means of promoting greater educational success, which, in turn, would lead to greater social mobility and therefore greater social equality for language minority children and their communities" (Schmidt, 2000, p. 131). Title VII provided educational support to poor children who were considered "Educationally disadvantaged because of their inability to speak English" (Crawford, 1992, p. 32). Title VII was designed to overcome language barriers and give language minority students equal educational opportunities.

The BEA provided financial incentives for school districts to implement bilingual education, and because it only funded bilingual education, Title VII defined native language instruction as the preferred approach for educating language minority students. The Act highlighted the importance of native language instruction as a means of giving voice and access to a largely ignored population of students. The BEA emphasized students' educational and civil rights to learn content knowledge in their native language, and was not focused solely on learning English, thus advocating the use of bilingual education. However, the Act did not specify a program/instructional approach, mandate bilingual education, or specify a method for the education of language minority students, which has allowed for various interpretations of what constitutes "bilingual education" and contributed to much of the current confusion surrounding bilingual education.

Lau v. Nichols

The U.S. Supreme Court has been central in advancing the rights of language minority students outlined in Title VII. In *Lau v. Nichols* in 1974, parents of non-English-speaking Chinese children

sued the San Francisco schools. They argued that their children could not access general education instruction because of the language barrier and were not receiving any special instruction, and therefore were denied equal opportunities to learn. It was the second case the Court had heard regarding language rights. In this case, the Supreme Court ruled that school districts were required to provide non-English-speaking students with equal educational opportunities, and that the San Francisco school district had failed to do so. It held that the 1964 Civil Rights Act meant that the failure of the school district to provide non-English speakers with instruction in a language they can understand discriminated on the basis of race and national origin as language minority students were not receiving equal benefits as the English speaking students and were consequently denied a meaningful opportunity to participate in school. The *Lau* decision set major legal precedent on language rights as inextricably linked to civil rights by mandating that the government provide adequate language accommodations. As stated in the majority ruling:

> There is no equality of treatment merely by providing students with the same facilities, textbooks, teachers, and curriculum; for students who do not understand English are effectively foreclosed from any meaningful education. Basic English skills are at the very core of what these public schools teach, imposition of a requirement that, before a child can effectively participate in the educational program, he must already have acquired those basic skills is to make a mockery of public education. We know that those who do not understand English are certain to find their classroom experiences wholly incomprehensible and in no way meaningful. (*Lau v. Nichols,* 1974, p. 26)

The Court ruled that schools must provide language minority students with some sort of "affirmative steps to rectify the language deficiency in order to open its instructional program to these students." The ruling made explicit that children have a right to learn in a language they can understand, and obligated school districts to provide meaningful education to students in that language. However, like the BEA, the ruling did not mandate bilingual education, require or state a preference for one educational method or instructional technique over another, and did not specify how the assistance was to be implemented, leaving this important decision to the states and individual school districts. Hence the various programs and practices found under bilingual education today. This is reflected in the continued debate about whether bilingual education is intended to provide transitional support or to produce individuals who are bilingual, a debate which is as old as the BEA. The Equal Educational Opportunities Act (EEOA) of 1974 codified the standards of *Lau*, by requiring that "No state shall deny equal educational opportunities to an individual on account of his or her race, sex, or national origin by the failure of an educational agency to take appropriate action to overcome language barriers that impede equal participation by its students in its instructional programs" (Equal Educational Opportunities Act, 1974, Sec. 204(f)).

Bilingual Elections and the Voting Rights Act

The Equal Protection Clause of the Fourteenth Amendment to the U.S. Constitution, passed in 1868, was supposed to guarantee equal protection to all U.S. citizens under the law. The Fifteenth Amendment, passed in 1870, was supposed to guarantee the voting rights of all U.S. citizens and end voting discrimination at any level of government on the basis of race, color, or previous servitude. Nevertheless, it took almost 100 years until the Civil Rights Movement in the 1960s for the U.S. government to enforce the Fourteenth and Fifteenth Amendments, and recognize that all U.S. citizens have equal rights and are entitled by virtue of citizenship to equal access to all

government and public institutions, as well as the right to full and free participation in public and political life without discrimination.

In response to a clash in Selma, Alabama in March 1965 known as "Bloody Sunday," where peaceful Black civil rights marchers led by the Rev. Dr. Martin Luther King, Jr. encountered White police officers with clubs, President Lyndon Johnson created the Voting Rights Act (VRA) of 1965. The Act is a benchmark of the Civil Rights Movement and was primarily enacted to bring an end to the widespread discrimination against Blacks, particularly in the South. It is widely considered to be one of the most effective pieces of legislation ever enacted. The permanent provisions of the Act banned racial discrimination in voting nationwide, guaranteed all U.S. citizens equal rights in voting, and eliminated various direct and indirect techniques used to disenfranchise voters, such as English literacy tests and poll taxes.

In 1975 the VRA was amended with the addition of Section 203, which extended voting protections to Native American, Alaskan Native, Asian American and Latino language minority groups. Section 203 was enacted in response to the considerable evidence that language minorities were systematically barred from participating in the political process through language barriers and discrimination on the basis of national origin. Section 203 is a temporary provision of the VRA that must be renewed by Congress to remain in effect. It requires under certain conditions[9] that certain state and local jurisdictions provide native language assistance to voters who are not literate or fluent in English. Under the mandate, all covered jurisdictions must provide language assistance in all voting related activities and materials, and poll workers must also be able to provide oral instructions and assistance in registration and voting at polling places. In July 2002 the U.S. Census Bureau determined that there were 31 states covered in whole or in part by section 203.

As President Johnson expressed at the time about the Civil Rights Movement, "[It] reaches into every section and State of America. It is the effort of American Negroes to secure for themselves the full blessings of American life. Their cause must be our cause too, because it is not just Negroes, but really it is all of us who must overcome the crippling legacy of bigotry and injustice. And we shall overcome." (Johnson, 1965, We Shall Overcome section, ¶ 1, 2 & 3). As clearly affirmed here, the absence of discrimination as a basic human, civil and Constitutional right, and the concept of free and equal access to participation in public and political life, are accepted as fundamental tenets of American life. However, the pursuit of these, what arguably continue to be, in many ways, ideals, is an ongoing challenge. Language requirements have historically been used to prevent U.S. citizens who speak languages other than English from voting, and since its enactment the VRA has been subject to various legal challenges. The VRA together with Title VI of the 1964 Civil Rights Act, which prevents exclusion from participation in, and discrimination under, federally assisted programs (such as education) on the basis of race, color, and national origin, are two critical pieces of legislation that have been the foundation for numerous laws and policies forbidding language discrimination and discrimination on the basis of national origin. It would be extremely unpopular and political suicide to go back on Title VI, but the probable quiet expiration of Section 203 looms in the near future. With Section 203 set to expire on August 6, 2007, unless it is renewed by Congress, the expiration of the provision will erode decades of progress for ethnic and linguistic minority groups.

Before bilingual elections, many language minorities, particularly Spanish-speakers, did not register to vote because they were unable to understand election materials and could not communicate with poll workers. Bilingual elections have encouraged Spanish speaking citizens to register and vote—a basic component of participation in the democratic process. The notion that bilingual elections promote cultural division is misplaced criticism. Bilingual elections encourage the

political participation of peoples who have historically been prevented from participating in the democratic process because of their inability to understand the English language. They do not promote separatism, but promote participation and the social and political integration of historically excluded and disenfranchised groups. Furthermore, contrary to widely held beliefs, language assistance in voting is not excessively costly. When well implemented, bilingual elections account for only a small fraction of the cost of the total election.[10] It is arguably a compelling state interest for the provision of language assistance in the political process to remain in effect as the social and political costs of eliminating those protections are steep. They would hinder progress and effectively take the country backwards. In a country where voter participation rates loom around 45 percent, such steps would be devastating and are incongruent with democratic ideals and the promotion of civic participation.

In light of these important federal provisions, language minorities do not have rights and protections equal to those of racial or ethnic minority groups—no piece of Civil Rights legislation explicitly bars discrimination on the basis of language (it is national origin that is used as a proxy for language). Existing protections are, simply put, not as numerous and not as strong. Furthermore, there has been a profound social and political attitudinal shift since the progressive 1960s and early 1970s that has resulted in less concern over minority rights in general, and the adoption of what are arguably socially and politically regressive measures that have stymied efforts to effect positive social change. Consequently, as we shall present, in the absence of solid federal protections and guarantees, numerous efforts have been made at the state and local levels to curb the rights of language minorities and impose restrictive language policies. With some important exceptions, they reflect prevailing values that are drastically different from those that led to the BEA and VRA, and which also reflect competing values about language rights and the most appropriate ways to integrate linguistic minorities. As we shall see, these efforts have been most successful through the efforts of the English Only movement and the adoption of English-only laws at the state level. In the following sections, recent language laws and policies at the federal, state and local levels will be discussed.

The English Only Movement and English-Only Laws

The first official language measure ever considered at the federal level was brought to the Congressional floor in 1923 by Washington J. McCormick, a Republican Congressman from Montana. The bill proposed to displace English by making "American" the official language of the United States. The measure died in committee, but was later adopted at the state level by Illinois.[11] It wasn't until the 1980s that the question of an official language was again raised.

Congress considered declaring English the official language for the first time in 1981, when California Senator Samuel Ichiye Hayakawa, an immigrant himself, introduced a Constitutional English Language Amendment. The amendment was dismissed. Not long afterwards he left Congress and, together with John Tanton, the founder of the Federation for American Immigration Reform (FAIR), founded U.S. English in 1983. Chilean immigrant Mauro Mujica succeeded Hayakawa as the leader of the organization. The organization is a "citizens' action group" dedicated to preserving the unifying role of the English language in the United States (U.S. English). As their mission statement says: "U.S. English believes that the passage of English as the official language will help to expand opportunities for immigrants to learn and speak English, the single greatest empowering tool that immigrants must have to succeed" (U.S. English). English Only is the largest and arguably the most influential organization of its kind, although there are

other similar organizations, such as English First founded in 1986, and English for the Children founded in 1997, which is solely dedicated to ending bilingual education.

In 1996, the U.S. House approved a bill to make English the official language. However, the bill failed because it lacked Senate support. Similar bills have appeared in every Congress since then (Schildkraut, 2005). Although most bills died in committee, in 1996 the Emerson English Language Empowerment Act passed in the U.S. House of Representatives. It failed in the Senate, but has been reintroduced since then (Ricento, 1998). If the Act had been approved, it would have made English the official language of the U.S. government, required that naturalization ceremonies take place exclusively in English, and repealed the bilingual voting requirements of the VRA. In addition, it stated that "no person shall be denied services, assistance, or facilities, directly or indirectly provided by the Federal Government solely because the person communicates in English" (Schildkraut, 2005, p. 13). Two similar bills were sent to Congressional committee in 2003.

Although proponents of English only have lacked success at the federal level, they have had tremendous success at getting English-only laws and amendments adopted in various states. As of this writing, 28 states have enacted various types of English-only laws and policies. In addition, at least 15 states have considered English language laws and constitutional amendments, and only seven, at most, have not publicly considered taking such action (Schildkraut, 2005). Some states, such as Massachusetts in 1975, have English-only policies in place as a result of a court ruling instead of legislative action. Such action has not gone unchallenged, though. For example, Arizona passed an English-only amendment in 1988, however it was declared unconstitutional in 1999 one the grounds it violated the First Amendment Right to free speech. Recently, in May 2005, the governor of Arizona vetoed an English Only bill that would have required the state to conduct all official business in English only. The governor vetoed the bill because she disagreed with the notion that a restriction on other languages would be the best way to encourage immigrants to learn English.

In 1988 Alaska voters approved a law requiring government workers to only speak English when conducting public business. However the law was challenged in state court and was never enforced. The court ruled that the law violated the constitutional right to free speech and that it served no compelling public interest. Alaska subsequently passed a constitutional amendment in 1998, however, it was overturned by the Alaska Supreme Court in 2002.

In spite of the success for English only at the state level, there are two officially bilingual states. Hawaii is officially bilingual in English and Hawaiian as prescribed by the constitution of Hawaii adopted in 1978. The constitution requires Hawaiian to be used in all official state business such as public acts, documents, and laws. In New Mexico the state constitution has provisions that protect Spanish, and the state officially recognizes both English and Spanish in the state. Official bilingualism in New Mexico dates back to 1848 and the Treaty of Guadalupe Hidalgo, which is supposed to protect the language and culture of the Mexicans who chose to stay after their land was annexed by the United States.

It is important to note that any state level action taken is unrelated to the process of a constitutional amendment to make English the official language. Nevertheless, in addition to English-only laws, various other types of language policies have been adopted at all levels of government as well as within civil society. These measures have been taken, in part, to address some of the many social policy issues posed by increasing language diversity, and illustrate the competing values that frame language conflict. These initiatives have had a tremendous impact and will have profound long-term consequences for language minorities. They also raise fundamental questions about the appropriateness and legality of restrictive language policies.

Language Laws and Policies at the Federal Level

The new immigration and the growth among linguistic minorities have raised a host of social, political, and economic issues that have come to the forefront over the last two decades. In particular, demographic changes are raising important policy questions about the provision of public and social services for immigrants, who are overwhelmingly Latin American. They also pose questions about language rights and exactly what kinds of protections language minority groups have, and how and if they are different from those extended to racial/ethnic minorities, and why. There are challenges inherent in designing effective policies to help immigrants adapt and become involved members of their communities and society in general, challenges that are inherent to the design of any public policy. Language diversity is one issue that poses challenges in education, healthcare, the workplace, social services, and in every aspect of U.S. society. The government and our most fundamental institutions have responded to increased linguistic diversity in various ways. In some instances, measures taken have clearly served to integrate and protect the rights of U.S. citizens and residents who happen to speak a language other than English. In others, they have served to exclude immigrants and language minorities from full participation in U.S. society. How to best integrate and meet the needs of a large and growing number of people who speak a language other than English has resulted in different responses at all levels of government, reflecting competing values about language and bilingualism. Two fairly recent actions in particular merit discussion: the case of *Hernández v. New York*, and Executive Order 13166.

Hernández v. New York

In 1991, the U.S. Supreme Court heard the case *Hernández v. New York*. The case was the third and last time to date that the court has heard a case regarding language rights. In the criminal case the victims and the defendant were all Latino. The prosecutor excluded potential jurors solely based on their ability to speak Spanish because he believed that such jurors would not accept a translator's version of the evidence presented. The defense argued that because language skills are closely tied to ethnicity, it is not race neutral to exclude jurors based on their Spanish language abilities alone, and doing so constitutes discrimination on the basis of race and national origin. Nevertheless, the prosecutor only challenged potential jurors with Spanish surnames and the result was a case tried without any Latino jurors—so much for the right to be tried by a jury of one's peers, and would appear to be as equally unjust as a Black person being tried by an all White jury.

In criminal cases jurors can not be challenged on the basis of race, and the Supreme Court heard the case because potential Latino jurors were excluded from the jury on the basis of language. In *Hernández v. New York,* the Court ruled that potential jurors may be eliminated based solely on their ability to speak a language other than English. Although jury duty is considered to be a fundamental component of civic engagement, the courts have consistently treated bilingualism and multilingualism as sufficient grounds to exclude persons from participating in this important and indispensable American sociopolitical and democratic institution, and basic aspect of U.S. citizenship (Rodriguez, 2001). The critical ruling means that a U.S. citizen may be excluded from a jury solely because of her/his ability to communicate in a language other than English and irrespective of their ability to communicate in English.[12] The case reflects current questions that have emerged at the intersection of race/ethnicity and language that have been pushed to the forefront by the new immigration, as well as a sociopolitical inability to reconcile the growth among Latinos with a Black-White racial paradigm within which it is impossible to squeeze a minority group not defined

by race or color, but overwhelmingly by language and culture. The court, however, neglected to address the race issue, but instead essentially marginalized prospective jurors based on language (Del Valle, 2003)—an arguably immutable characteristic that has historically served as a proxy for race and a tool with which to exclude immigrants, and ethnic and cultural minorities.

Executive Order 13166

On August 11, 2000, then President William Clinton signed into law Executive Order 13166 entitled "Improving access to services for persons with limited English proficiency." The act requires any organization, agency, or institution receiving federal funds to provide services in a language other than English if necessary. For example, private physicians, clinics, and hospitals that accept Medicare and Medicaid must provide translators for patients who are limited English proficient at their own expense. The goals of the act are to improve access to federally operated and assisted programs and services by persons with limited English skills, and ensure that such programs and services do not violate Title VI of the Civil Rights Act. In a way, and to a certain extent, the act promotes federal support of multilingualism. Some, namely U.S. English, argue that it has made the federal government, to a certain extent, multilingual.

The act signed by President Clinton demonstrates support for the needs of language minorities at the federal level, and established at least some level of responsibility the government has in ensuring limited English speakers have access to fundamental social and public services. Nevertheless, it is not a comprehensive language policy or tantamount to a federal policy of multilingualism. Rather, it is one piece of a complex web of language policies that are in effect at various institutional and governmental levels. These policies often compete with each other to further the professed goal of sociocultural and political integration of linguistic minorities.

Language Laws and Policies at the State and Local Levels

The increase among the language minority population poses significant public policy challenges to state and local governments. Conflicts over language have become increasingly common as the racial/ethnic and cultural composition of the country has evolved. As the country has struggled with immigration and population change, these two issues that have presented serious challenges at all levels of government, but have largely been left up to the states to address. Some feel that this is an example of the federal government wanting to stick responsibility for tackling theses issues to the states, while others feel it is a state's rights issue. Others argue that this is an example of the influence of corporations and big business on the federal government, who arguably profit from immigration policy as it currently is because it provides a steady stream of cheap labor that allows them to keep costs down and maintain a high profit margin. Some simply say that this is what happens in a period with strong political and social opposition to big government and a greater emphasis on state's rights and power. Whether or not all or any of these things are true is a matter of perspective and opinion.

Parallel to increased immigration, population change, and the resultant policy issues, the language policy debate has largely shifted from the federal government to states and localities. Efforts toward an English Language Amendment or the institution of Official English have somewhat subsided in recent years. In part, this is because adopting such a measure, let alone any measure, at the federal level poses and has posed certain challenges, whereas efforts toward such measures at the state

and local level are more likely to succeed—and, as we shall see, have been quite successful. It may also be, in part, because such a move at the national level would be politically difficult as immigration is on the rise, and as the number of language minority persons, who are predominantly Spanish-speaking Latino and constitute a large and growing percentage of U.S. voters, continues to grow. For these and perhaps other reasons, proponents of English only have focused their efforts at the state and local level, where numerous laws and policies have been adopted in recent years.

Although language minorities have certain rights and protections guaranteed by the federal government, in the absence of a single language policy and the presence of contradictory theories of language rights at the federal level, competing values and theories of language rights are playing out at the state and local levels. States, such as Alabama, have attempted to implement English-only driver's tests laws, and localities, such as Atlanta, Georgia, have instituted ordinances requiring signs to be written primarily in English (Schildkraut, 2005). Sometimes such efforts indicate legitimate attempts to deal with a challenging and emerging social issue for which resources are limited, and others are examples of blatantly discriminatory policies that have directly targeted a specific ethnic or linguistic group. Together, these diverse policies illustrate the tension and ambivalence in the design and objective of language policy resulting from the absence of a single coherent ideology of language use and choice. Laws and policies for the education of language minority students can be used to illustrate this point.

The Education of Language Minority Students

The education of language minority students is the most prominent and contentious issue raised by the new immigration. As the foreign-born population has grown, language minority students have become increasingly visible and their education has evolved into a highly controversial public issue. Demographer Jeffrey Passel found that schools were educating 11 million children of immigrants, and that approximately 10% of public school children spoke English poorly or not at all (Dillon, 2003). The limited English proficient (LEP) student population has more than doubled between 1989–1990 and 2003–2004 (Padolsky, 2005b), and the U.S. Census Bureau predicts that by the 2030s students whose home language is not English will comprise 40% of the school-age population. The National Clearinghouse for English Language Acquisition and Language Instruction Educational Programs (NCELA) estimates that there were just under 5 million students in some-sort of bilingual education program in the United States in grades K through 12 during the 2003–2004 school year (Padolsky, 2005a). Although the (NCELA) estimates that LEP students represent a small share of the total U.S. student population at 10.3% (Padolsky, 2005a), according to figures from 2000–2001, 79% of LEPs are native Spanish speakers (Padolsky, 2002). In 1999, 71% of Latino children and youth ages 5 to 17 spoke a language other than English at home, and of these 23% had difficulty speaking English (National Center for Education Statistics, 2003).

The debate over bilingual education intensified in the 1990s when immigration that was and is largely Latin American, increased. Bilingual education has become the heart of the language debate, and the controversy over bilingual education in many ways can be used to gauge prevailing attitudes toward immigrants and non-English speakers. Notably, it is in education that the English Only movement has had significant achievements by successfully championing the end of bilingual education in three states.

Many important policy changes impacting language minority students have taken place since the late 1990s (see Table 10.3). Not long after President Clinton signed Executive Order 13166

Table 10.3 Policy Changes Impact Language Minority Students Since Late 1990s

1998	Proposition 227 eliminates bilingual education in California
2000	Proposition 203 eliminates bilingual education in Arizona
2002	The 1968 Bilingual Education Act expires and is replaced by the English Language Acquisition Act under the larger federal education policy No Child Left Behind
2002	Question 3 eliminates bilingual education in Massachusetts. A similar voter referendum fails in Colorado

into law, the Bilingual Education Act (BEA) quietly expired on January 8, 2002. The Act was eliminated as part of current President George W. Bush's sweeping federal education policy, No Child Left Behind (NCLB). Under NCLB, the BEA was essentially transformed into the English Language Acquisition Act (ELAA).[13] The change was a complete reversal of 34 years of education policy for language minority students, and shows how bilingual education is effectively being quietly dismantled at the federal level. Whereas the BEA sought to develop English language skills and, to the extent possible, develop native language skills, under NCLB the emphasis is on the acquisition of English language skills only. The switch affirms Hakuta's (1986) position that in the U.S. bilingualism is widely understood as a transitional period leading to English monolingualism.

The change at the federal level illustrates the federal government's reneging on its commitment to language minority students as spelled out in the BEA in 1968, as well as waning social and political support of language assistance for linguistic minorities. Furthermore, although the *Lau* decision is supposed to guarantee the constitutional rights of language minority students to learn in their native language, more drastic steps have been taken at the state level. The English for the Children Campaign spearheaded by Ron Unz has successfully used the citizen's initiative process in California, Massachusetts, and Arizona to eliminate bilingual education in those three states and replace it with mandated one-year English immersion. Popularly known as Unz initiatives, the anti-bilingual education voter referenda passed in California in 1998 (Proposition 227), Arizona in 2000 (Proposition 203), and Massachusetts in 2002 (Question 2). Ironically, Massachusetts was the first state in the country to pass bilingual education legislation in 1971. A similar referendum failed in Colorado in 2002.

The Unz initiatives have effectively enacted an ideology of monolingualism by dictating language use in public schools (Stritikus, 2002). This reflects current attitudes toward language diversity that perceive bilingualism as irrelevant and of questionable social value. The controversy over bilingual education also highlights the perceived threat of a cultural and linguistic takeover posed by bilingualism and which drives the language policy conflict. As Espinoza-Herold (2003) poignantly states: "Bilingual education in the United States has been successfully utilized by conservative and racist political groups as an anti-immigrant weapon and as a way to instill fear among the White population of a growing Mexican cultural and linguistic invasion" (Espinoza-Herold, 2003, p. 8).

Importantly, language minority students in California, Massachusetts, and Arizona have become the only student population in the United States to be enrolled in public education programs subject to the regulation of instructional content and methodology. It would seem that the *Lau* decision means that mandated English immersion for all language minority students is a violation of their constitutional rights. However, the voter initiative process has been used to sidestep

the legislative process and institute lawfully and constitutionally questionable policies that are arguably discriminatory as they primarily target Spanish-speaking Latinos, as well as being potentially pedagogically unsound. In 1998 a class action lawsuit was filed to block Proposition 227 from going into effect in California. The case, *Valeria G. v. Wilson,* was based on the claim that the policy violated the educational and civil rights of LEP students under the law. However, the United States District Court for the Northern District of California upheld the constitutionality of Proposition 227. The ruling was appealed.

Scientific evidence seems to overwhelmingly indicate the importance of native language instruction for the acquisition of English language skills and overall academic achievement of language minority students. In the largest, and perhaps most important, study on language minority education to date, Thomas and Collier (1997, 2001) conducted a longitudinal study of thousands of limited English proficient (LEP) students between 1985 and 2001. The study sought to determine the amount of time LEP students needed native language instruction before they could perform on grade level in English, and what were the variables that affected long term academic achievement. Researchers found that students in bilingual programs scored at or above their native English speaking peers, and that students schooled bilingually had higher levels of academic achievement than students schooled monolingually. The research also found that LEPs in English immersion had the highest number of school dropouts. They concluded that skill and the amount of instruction in the native language were the best predictors of English language achievement, and that native language instruction was the most effective program type for educating language minority students. Their research demonstrated that it takes a minimum of four years for LEPs to reach grade level performance in English, and a minimum of five years to attain English language skills and academic achievement levels equal to their native English-speaking peers. They recommended that students with no English skills should not be placed in 1 to 3 year English immersion programs. These findings were echoed by August and Hakuta (1997) in their report to the National Research Council, where they reported that bilingual education produced better results than English immersion on key outcome variables. They reported no significant evidence that native language instruction impedes the development of English language skills or the overall academic achievement of LEP students, and that effective programs for LEP students include some use of the native language (August and Hakuta, 1997). Furthermore, Hakuta, Goto, and Witt (2000) found it takes 3 to 5 years to develop oral English proficiency, and 4 to 7 years to develop academic proficiency.

Research on bilingualism has also yielded evidence indicating the various cognitive advantages of bilingualism (see also Simonton, this volume). One of the landmark studies on bilingualism was conducted by Peal and Lambert (1962). Controlling for socioeconomic status, they found that bilingual students outperformed monolingual students on almost all cognitive tests (see also Hakuta, 1986, Portes & Rumbaut, 2001). Although the study had its limitations and shortcomings, Hakuta (1986) argued in support of its major findings. Scholars have also argued that bilinguals can develop greater cognitive flexibility (August & Hakuta, 1997; Cummins, 1978 [as cited in Portes and Rumbaut, 2001]; Leopold, 1970 [as cited in Portes & Rumbaut, 2001]). The sociologist Ruben Rumbaut (1995), in his study of immigrant children in California, found that fluent bilinguals outperformed limited bilinguals and English monolinguals in academic tests and had higher GPAs. Research by August and Hakuta (1997) suggests that bilinguals may have overall linguistic, cognitive, or social developmental advantages over monolinguals when controlling for socioeconomic status.

Although there is a clear, positive correlation between bilingualism and cognitive ability, it is unclear whether it is bilingualism that causes greater cognitive ability or if greater cognitive

ability causes the development of bilingual skills. Although the causal direction is unclear, most researchers have found that there is a positive association between bilingualism and cognitive development, and most agree that bilingualism does not impair existing cognitive abilities (Ma, 2002; Portes & Rumbaut, 2001). Appropriate, scientifically sound educational practice is, at least, a pedagogy based on evidence that nurtures the potential in every child and promotes each child's optimal development through challenging curricula embedded in a sound educational program. Evidently, not using the native language to educate language minority students is in contradiction to existing science (August & Hakuta, 1997; Hakuta, Goto, & Witt, 2000; Ma, 2002; Thomas and Collier, 1997, 2001), and holds predominantly Latino language minority students to a sub-par education that does not provide them with the opportunity to realize their maximum potential, either by prohibiting language minority students with greater cognitive abilities from developing their bilingual skills, or by preventing them from developing greater cognitive abilities by nurturing their bilingual skills. This is not in the best interest of individual children or of the nation. It is also, arguably, an example of present day unequal educational opportunity based on national origin.

Although the evidence weighs heavily in favor of native language instruction, the research is limited and can be used to support both English immersion and native language instruction. Although the research has not conclusively demonstrated the superiority of native language instruction for all LEP students in all contexts (Crawford, 2000), no study has suggested that English immersion is better, whereas numerous studies have found bilingual education to be more effective. The evidence suggests that there are various programs types that would be successful in educating LEP students. Researchers widely agree that one year of English immersion is inadequate to prepare students to succeed in English mainstream classrooms because it takes four to eight years to develop the English language skills necessary to succeed in an English-only classroom (August & Hakuta, 1997; Ma, 2002; Suarez-Orozco and Suarez-Orozco, 2001; Thomas & Collier, 1997, 2001). As succinctly stated by The National Clearinghouse for English Language Acquisition (NCELA) funded by the U.S. Department of Education: "The more the native language is academically supported, in combination with balanced second language development, the higher language minority students are able to achieve academically in the second language each succeeding year, in comparison with those instructed only in the second language" (NCELA, 2005). Clearly, the direction of education policy for language minority students at both the federal and state levels, notably the changes affecting LEP students outlined in the federal NCLB, contradicts the majority of well-established research.

No longer solely a question of appropriate educational practice, the anti-bilingual education referenda have made the education of language minority students into an important legal, political, and civil rights issue. In particular, questions about who in particular is affected, if not targeted by, the policy shift is paramount to understanding its impact, and determining its legitimacy and legality. Evidently, the policy shift impacts a large and growing segment of the U.S. school-age population that is predominantly Spanish-speaking Latino. This raises important questions about a policy that, intentionally or not, primarily affects one ethnic and linguistic minority group in particular. In light of the facts, such a policy can not constitute an ethnically neutral policy. Whether or not one-year English immersion and the elimination of native language programs for LEP students is legally viable is one question; whether or not it is appropriate and constitutional to have a de facto policy based on ethnicity, language, and minority status is another. This raises a plethora of civil rights issues and questions about whether or not such policies violate the equal protection clause and discriminate on the basis of race/ethnicity and national origin. These are not insignificant consequences that can be dismissed as unintended. The controversy over language

education policy mirrors nationwide concerns over how to socially integrate and meet the needs of immigrants and people with limited English language skills, an issue that in large part is driven by questions about how to integrate and meet the unique needs of Spanish-speaking Latinos into the existing and evolving U.S. sociocultural context, which is rapidly changing due to the growth among Spanish speaking Latinos.

Discussion: The Social and Cultural Contexts of Language Conflict

Language conflict is about values and the language policies that result are about values as well. Some fundamental American ideals are central parts of the debate over language in the United States. Freedom, individualism, economic opportunity, participatory democracy, and tolerance are ideals championed by both opponents and proponents of English-only policies and restrictive language laws. What these ideals and the people who call on them have in common is that they both seek to protect what they believe is American (Schildkraut, 2005, p. 4). Individual feelings about national identity drive people's opinions on language and immigration issues and consequently their policy views. These ideas and opinions sometimes lead people to think that making English the official/national language is in the best interest of the nation, while others feel it would impinge on some of our basic rights and freedoms and run against what America stands for (Schildkraut, 2005, p. 5).

It would seem that unity based on conformity is in conflict with some of the most fundamental American principles. For many Americans, the notion of an official/national religion, such as one might find in a dictatorship or in a country governed by religious law, would be unfathomable, and with good reason. In the United States we have separation of church and state and freedom of religion for very important reasons—for reasons that set the United States apart from many other countries around the world. Religion is not centralized nor within the purview of the government, and freedom of religion is one of our most basic civil liberties. Although Judeo-Christian faiths have clearly had a tremendous impact on the nation, it was not as a result of institutionalized religious practice. However, although the founders did not envision a Jewish or Islamic state, Jews and Muslims have the freedom to practice their religion freely. Freedom of religion and separation of church and state do not compromise national unity or forsake a national identity. To suggest that bilingualism or the absence of a national language has that effect is incongruous because it contradicts the most fundamental American values of freedom and individualism. As Rodriguez (2001) states, "The response should be to accommodate linguistic difference, much in the way that the law struggles to accommodate religious minorities and to enable the free exercise of religion" (Rodriguez, 2001, p. 142).

Language, like race/ethnicity or culture, is an immutable aspect of identity and is not a matter of personal choice. As Rodriguez (2001) argues, choice of language, like choice of culture, is a fictional construct. That certain population groups have been treated differently *because of their language* is discriminatory on the basis of race/ethnicity and national origin, and a violation of the equal rights and protections guaranteed to all U.S. citizens by the constitution. Whether or not and under what circumstance English-only laws and restrictive language policies violate the equal protection clause and infringe upon the constitutional and civil rights of language minority persons are critical questions upon which the controversy over language policy hinges today. Federal protection of language minorities has weakened and remaining provisions are in danger. The courts have generally ruled in favor of protecting the rights of language minorities, however

recent court rulings have had the ironic effect of curbing the civil rights protections of those who do speak English simply because they speak another language. It is doubtful that such an approach promotes sociocultural integration and fosters a sense of national unity.

The language policy conflict is also about identity politics. Both opponents and advocates of restrictive language laws would agree that language is a central aspect of individual and group identity and more than simply a communication tool. Some argue that language is a critical aspect of national identity and is necessary for national unity. Others argue that language is "A symbol of cultural allegiance" (Rodriguez, 2001, p. 133). But in a multicultural country like the United States that is increasingly becoming more diverse, the concept of cultural allegiance is ambiguous. Should immigrants have to "give-up" their native/home culture for an American culture? If so, culture is akin to religion, in which case should immigrants or any person within the political borders of the United States have to give up their religion in order to participate in American life and become an American? If we are a nation of many cultures, which culture should people have allegiance to? If it is American culture, what exactly is American culture if America is multicultural? Is it White-Anglo-Saxon-Protestant culture that holds this country together and to which citizens should have allegiance to, or is it our constitution and Bill of Rights that holds this diverse country together, and our civil liberties and social and political freedoms that citizens should have allegiance to, and which define us as American?

Proponents of English-only laws argue that a common language is necessary for national unity and a requisite for U.S. citizenship. They argue that being American means learning English, and that English language skills are a central aspect of American life and identity. The conflict over language reflects, in part, a cultural conflict between what is believed to be American culture and what is perceived as foreign. Language is related to different social and cultural networks, and those networks are coupled to value systems. In part, the social and political values attached to certain languages result from competing values about individual, group, and national culture, identity, and what it means to be an American. The issue is exactly which of those values are necessary for participation in American life and integration into U.S. society. Are they values that transcend language, such as a belief in participatory democracy, or are they values that proscribe specific behaviors, such as organized prayer, and impinge on our civil liberties, such as prohibiting "religious dress" in public?

There is no reason to suggest that the presence of multiple languages results in social unrest, a lack of social cohesion, or conflict between groups. The conflict over language in the United States is not about language itself, but rather, in part, about the deeper social and personal issues of racism, and the profound social inequalities that exist between groups of people who happen to speak different languages. It is a conflict rooted in cultural differences, questions about socioeconomic status, and our pervasive and deeply entrenched socioeconomic inequalities that are related to, but do not necessarily result from, tensions between individual, group, and national identity. It may also be a conflict rooted in a fear of competition, in the sense that bilinguals could be better prepared for jobs than monolinguals.

Monolingualism is not the norm, not in the United States, nor in any other country. It is doubtful that it is possible or in the best interest of the nation to try and absorb linguistic minority groups into a monolingual, monocultural Americana because such a country is a fictional construct. Most importantly, the legitimacy and legality of restrictive language policies is, at best, debatable. Furthermore, it is questionable if *assimilationist* policies are appropriate for a country with high immigration and such rapid population change. Demographic realities into the foreseeable future suggest that an appropriate policy response would be to design policies that have immigrant integration as their primary goal. Only through such efforts will the country incorporate

concerned and involved citizens. As Rodriguez (2001) states: "The principle of free and equal access to participation in public life animates the language debate and should be at the heart of any effort to protect and empower linguistic minorities" (p. 135). It is questionable if restrictive language policies are an effective means to achieve the goal of integration, and it is probable that they may have the opposite effect.

Summary and Conclusion

Bilingualism has powerful sociocultural and political significance. From one perspective, one could argue that the United States was meant to be a country founded by and for Whites, meaning the descendants of European immigrants, possessing a White-Anglo-Saxon-Protestant, English-speaking culture. Regardless of whether or not the United States is a culturally and linguistically monolithic place, because the founders intended or expected it to be that way, the rest are perhaps realities to which cultural and linguistic minorities must adapt. Such is the law of majority rule. On the other hand, the United States is and has always been a multicultural country comprised of people from all over the world, and to believe and promote otherwise is to inhibit sociocultural and political progress. It is to shun the very values that this country purports to stand for.

The United States has no official language, although the issue was discussed by the nation's founders when the country was in its infancy. Nevertheless, throughout U.S. history, language has shaped the way in which people conceptualize their understanding of conflicts between different cultural and immigrant groups. As U.S. history shows, language has often served as a proxy for the exclusion of immigrants, and cultural and ethnic minority groups when such groups are perceived as a threat. The United States has a history of systematically denying and restricting minority people their culture and language in an effort to ensure and strengthen their subordinate, minority status under a system of domination and oppression. Unfortunately, such realities are every much a part of our current reality as they are a part of our past. Language has been used and continues to be used today as a tool to Americanize immigrants and minority groups, and further the full cultural and linguistic assimilation—as opposed to acculturation—of new Americans. The fears of difference and immigrants that drove such language based anti-immigrant measures in the past are the same ones that inform restrictive language policies primarily targeted toward Spanish-speaking Latinos today. As we have seen, such laws and policies promote segregation, exclusion, serve to maintain the social stratification system present in the United States, and do not foster sociocultural integration. There are few, if any, reasons to believe that the effect of such measures could have a different impact today.

Current concerns about language and bilingualism are directly related to concerns about evolving diversity largely driven by Latin American immigration. As Samuel Huntington states: "The single most immediate and most serious challenge to America's traditional identity comes from the immense and continuing immigration from Latin America" (Huntington, 2004, ¶ 7), He and other proponents of restrictive immigration and language laws believe that Latin American immigration poses a threat to the cultural and political integrity of the country, and will lead to a de facto split within a Spanish-speaking and English speaking United States (Huntington, 2004). Because current restrictive language policies primarily impact one ethnic and linguistic minority group, Spanish speaking Latinos, they are examples of de facto ethnically-based sociocultural policies. As such, they can not be ethnic or culturally neutral policies any more than share cropping policies in the U.S. south after the Civil War can be construed as racially neutral.

The story of Babel portrays bilingualism as an obstacle and impediment to human progress. However, the assertion that bilingualism is a sociocultural and political liability is completely dumbfounded. Language skills are a tremendous resource and asset. However, the United States does not have a single language policy. Instead, various types of language laws and policies exist at various levels of government, some of which have resulted from court rulings and not through any legislative process, and others which have been implemented through voter referenda. These policies do not reflect a consistent theory of language use and choice or ideology of language rights, but rather they illustrate the many beliefs and contradictory ideas about language and bilingualism. Even though language minority groups are undergoing linguistic assimilation similar to, if not faster than, previous immigrant groups, the fact that immigration is high, steady, and shows no indication of slowing suggests that, for at least far into the future, there will always be a substantial population of non-English speakers. Furthermore, even as subsequent generations become English monolingual speakers, the fluidity of borders and the constant stream of immigrants ensure the presence of diverse cultures, and consequently a linguistically diverse populace. Are restrictive language policies the best way to integrate the New Americans into U.S. society? Is there any evidence that suggests restrictive language policies have achieved this goal in the past and will advance it in the future, or does simply the pursuit of such restrictive policies result in a sociocultural and political conflict that could otherwise be avoided, resulting in discord instead of unity?

Most previous immigrants suffered some degree of social, political, and cultural exclusion. Nevertheless, they were eventually accepted by the dominant White-Anglo-Saxon-Protestant majority and were able to integrate into U.S. society. However, the new immigration is drastically different from previous waves. They overwhelmingly come from within the hemisphere, many go back and forth, and huge numbers are undocumented. They are not European and they are not White in culture, language, race, or ethnicity. Economic structures have changed. The ability to work one's way up the socioeconomic ladder is effectively nonexistent as the gap between the rich and poor has grown tremendously over the past 30 years, and as the mechanisms that allowed previous immigrants to climb the ladder—entry level, blue collar, factory work requiring limited skills and education—have basically been eliminated by technological and industrial advances and market and economic changes. The old model of immigrant integration does not apply to the new immigration. There are aspects of the new immigration and characteristics of new immigrants that set it apart from previous immigrants. Importantly, the new immigration, overwhelmingly Latino, has a social stigma attached to it unlike any other previous immigrant groups. How can that stigma be transcended for the benefit of the nation? How can society and the government respond? That the United States is undergoing massive population changes is a reality to which appropriate responses must be developed and implemented at all levels of government and within civil society, and measures taken should protect the rights of language minorities just as racial and ethnic minorities should be protected from discrimination. Immigration is not a temporary phenomenon that will go away. Language diversity has been omnipresent within the borders of the United States and linguistic diversity will be an integral aspect of the nation in the future. The new immigrants are here to stay, and they are bringing their languages and cultures with them. They are the New Americans. As Huntington (2004) writes, "There is no Americano dream. There is only the American dream created by an Anglo-Protestant society. Mexican Americans will share in that dream and in that society only if they dream in English" (Irreconcilable Differences section, ¶ 5). Is this the kind of constructive attitude that will promote the integration of new immigrants and ensure a prosperous future for the nation, or is it destructive? History offers some insights, but only time will tell.

Endnotes

1. Although the term *American* is commonly used to denote persons with citizenship in the United States of America, the Americas encompass the entire western hemisphere and all persons with citizenship in any country in the Americas are *Americans*. However, we use the term *American* specifically with reference to the United States only, unless otherwise noted.
2. The term *Latino* is not a racial category. Latinos in the United States are a culturally diverse pan-ethnic group and may be of any race. Latinos are defined as having ancestry in any of the Spanish speaking countries of Latin America or Spain. Latinos are a culturally, ethnically, and racially diverse group with a shared origin in Latin American or Spain, and frequently self-identify as united by the Spanish language.
3. The Monroe Doctrine, issued by President James Monroe in 1823, declared that the Americas should be closed to colonization by European countries in the future, and that sovereign states in the Americans should be free from European interference. It also proclaimed that the United States would remain neutral in wars between European countries and their colonies, but would consider any European interference with sovereign states in the Americas as a hostile act toward the United States. The Doctrine was intended to declare the United States' opposition to colonialism. However, in strict departure from its professed moral objections, the United States did assume, and continues to have to this day, colonial rule over the island nation of Puerto Rico.
4. It is important to note that this quote has been attributed to various people in addition to James Ferguson. Its exact origin is unknown.
5. There is some disagreement on this point, which Schildkraut (2005) acknowledges. Spolsky (2004) states that after Louisiana was purchased, the new governor required that English be used for all public matters; however, the 1845 constitution provided for bilingualism at the legislature, although this was later reversed by the 1879 constitution.
6. The concept of "race" is a social and political construct that is not static and has changed over time. However, it is not within the scope of this chapter to discuss this issue. For further reading, see Derrick Bell, *Race, racism, and American law (5th Ed.), and* Juanita Tamayo Lott, *Asian Americans: From racial category to multiple identities.*
7. *Immigrant* and *foreign born* are used synonymously here. The terms denote persons living in the United States who were not U.S. citizens at birth. It includes persons who are naturalized U.S. citizens, legal permanent residents (green card holders), undocumented immigrants (*illegal aliens*), and people living in the United States on long-term temporary visas such as students or guest workers. It does not include those born abroad to U.S. citizen parents, who are automatically granted U.S. citizenship. This is the same definition used by the U.S. Census Bureau.
8. The U.S. Census Bureau defines linguistically isolated households as households where no person over the age of 14 speaks only English, or households where no person over the age of 14, who speaks a language other than English, speaks English at least very well.
9. A state or locale is required to provide such language assistance under two conditions: (a) if one of the protected language minority groups is more than 5% of the voting-age citizen population in a jurisdiction and has limited English proficiency, or (2) where more than 10,000 voting-age citizens in a jurisdiction belong to a single language minority group and are limited English proficient, and the illiteracy rate of that group exceeds the national illiteracy rate.

10. For more information, visit the Web site of the Leadership Conference on Civil Rights/ Leadership Conference on Civil Rights Education fund at http://www.civilrights.org
11. For the exact wording of the proposed legislation, visit the Web site http://ourworld.compuserve.com/homepages/JWCRAWFORD/american.htm
12. In 1968 the U.S. Congress adopted a law requiring that persons sitting on a federal jury must be able to speak English and "read, write, and understand the English language with a degree of proficiency sufficient to fill out satisfactorily the juror qualification form" (Del Valle, 2003, p. 187). There are clear reasons that justify the requirement that jurors possess a certain degree of English proficiency, and prospective federal jurors have been challenged based on their English language skills alone. However, it is questionable if bilingual skills and proficiency in a language other than English should be used to exclude potential jurors.
13. There are various changes that have resulted from the policy shift. For more information, visit James Crawford's web page and read the article "The Bilingual Education Act, 1968–2002" at http://ourworld.compuserve.com/homepages/JWCRAWFORD/T7obit.htm

List of Key Words and Concepts

Acculturation, Americanization, Assimilation, Deficit model of bilingualism, Exceptionalism, *Hernández v. New York*, Hereditarian, Hispanophobia, Manifest Destiny, *Lau v. Nichols*, *Meyer v. Nebraska*, Nativist, *Valeria G. v. Wilson*, Xenophobia

Internet Sites Related to the Social and Cultural Contexts of Bilingualism

Bilingual Research Journal Online: http://brj.asu.edu/
Center for Applied Linguistics: http://www.cal.org/
Education Policy Studies Laboratory at Arizona State University: http://www.asu.edu/educ/epsl/
English for the Children: http://www.onenation.org/
James Crawford's Language Policy Website and Emporium: http://ourworld.compuserve.com/homepages/JWCRAWFORD
National Clearinghouse for English Language Acquisition and Language Instruction Educational Programs: http://www.ncela.gwu.edu
Office of English Language Acquisition, U.S. Department of Education http://www.ed.gov/about/offices/list/oela/index.html?src=mr
U.S. Census Bureau: http://www.census.gov/
U.S. English: http://www.us-english.org/

Discussion Questions

1. What kinds of policies would be most appropriate to help integrate language minorities?
2. What kinds of policies would be most appropriate in helping limited-English proficient persons attain English language proficiency?

3. Do current policies promote the integration of immigrants and language minorities or do they serve to exclude? How and why?
4. Does the government have a responsibility in the area of language policy? If so, at what level of government? Is federal involvement tantamount to "big government"? Should language policy be a state, local and/or private issue?
5. What is the sociocultural and political benefit of bilingualism?
6. What is the sociocultural and political benefit of monolingualism?
7. Are anti-bilingual education/English immersion voter referenda, which limit instruction in a language other than English, constitutional, legitimate, and appropriate, or do they constitute discrimination on the basis of national origin, as held under *Lau v. Nichols*?
8. Is a common language necessary for national unity, and in a multicultural country, what does the English language have to do with being "American"?
9. Does immigration to the United States entail cultural and linguistic sacrifices? If so, what and how?
10. Can a balance between the home/native culture and language and the dominant culture and language in the United States be found?

Suggested Readings

Crawford, J. (2000). *At war with diversity: U.S. language policy in an age of anxiety.* Clevedon, England: Multilingual Matters, Ltd.

Del Valle, S. (2003). *Language rights and the law in the United States: Finding our voices*. Clevedon, England: Multilingual Matters.

Hakuta, K. (1986). *Mirror of language: the debate on bilingualism.* New York: Basic Books.

Hanson, V. D. (2003). *Mexifornia: A state of becoming*. San Francisco: Encounter Books.

Huntington, S. P. (2004). The Hispanic challenge. *Foreign Policy* (no page numbers), March/April 2004. Retrieved March 14, 2004, from http://www.foreignpolicy.com

Pullum, G. K. (1991). *The great Eskimo vocabulary hoax and other irreverent essays on the study of language*. Chicago, IL: University of Chicago Press.

Rodriguez, C. M. (2001). Accommodating linguistic differences: towards a comprehensive theory of language rights in the United States. *Harvard Civil Rights-Civil Liberties Law Review, 36*, 133–223.

Schildkraut, D. J. (2005). *Press one for English: Language policy, public opinion, and American identity*. Princeton, NJ: Princeton University Press.

Schmidt, R. (2000). *Language policy and identity politics in the United States*. Philadelphia: Temple University Press.

References

Anzaldua, G. (1987). *Borderlands la frontera: The new Mestiza*. Aunt Lute Books.

August, D., & Hakuta, K. (1997). *Improving schooling for language minority children: A research agenda.* Washington: National Academy Press.

Bell, D. (2004). *Race, racism, and American law* (5th ed.). New York: Aspen Publishers.

Berry, J. W., Poortinga, Y. H., Segall, M. H., & Dasen, P. R. (2002). *Cross cultural psychology: Research and applications* (2nd ed.). UK: Cambridge University Press:

Camarota, S. A. (2002). *Immigrants in the United States—2002: A snapshot of America's foreign born population*. Washington, DC: Center for Immigration Studies. Retrieved from http://www.cis.org/articles/2002/back1302.html

Capps, R., Fix, M., & Passel, J. (2002, November 26). *The dispersal of immigrants in the 1990s*. Brief No. 2 in Series "Immigrant Families and Workers: Facts and Perspectives." Washington, DC: Urban Institute. Retrieved from http://www.urban.org/url.cfm?ID=410589

Crawford, J. (1992). *Hold your tongue: Bilingualism and the politics of "English only."* Reading, MA: Addison-Wesley.

Crawford, J. (1999). *Bilingual education: History, politics, theory and practice*. Los Angeles: Bilingual Educational Services.

Crawford, J. (2000). *At war with diversity: U.S. language policy in an age of anxiety.* Clevedon, England: Multilingual Matters, Ltd.

Crawford, J. (2003). Hard sell: Why is bilingual education so unpopular with the American public? Arizona State University/EPSL/Language Policy Research Unit. Retrieved from http://www.asu.edu/educ/epsl/LPRU/features/brief8.htm.

Del Valle, S. (2003). *Language rights and the law in the United States: Finding our voices*. Clevedon, England: Multilingual Matters, Ltd.

Dillon, S. (2003, November 5). School districts struggle with English fluency mandate. *The New York Times*.

Equal Educational Opportunities Act of 1974, Pub. L. No. (93-380), 88 Stat. 514 (1974).

Espinoza-Herold, M. (2003). *Issues in Latino education: Race, school culture, and the politics of academic success.* Boston: Allyn and Bacon.

Fitzgerald, J. (1993). Views on bilingualism in the United States: A selective historical review. *Bilingual Research Journal, 17*(1&2), 35–56.

Fradd, S. H., & Boswell, T. D. (1999). Income patterns of bilingual and English-only Hispanics in selected metropolitan areas. In S. H. Fradd (Ed.), *Creating Florida's multilingual global workforce, educational policies and practices for students learning new languages* (no page numbers). Tallahassee, FL: Florida Department of Education. Retrieved from http://www.ncela.gwu.edu/pubs/florida/workforce99/index.htm

Garcia Coll, C., Lamberty, G., Jenkins, R., McAdoo, H., Crnic, K., Wasik B., and Garcia, H. (1996). An integrative model for the study of developmental competencies in minority children. *Child Development*, *67,* 1891–1914.

Grimes, B. F., & Grimes, J. E. (Ed.). (2000). *Ethnologue: languages of the world* (14th ed.). Dallas, TX: SIL International.

Grieco, E. (2001). *The White population: 2000, Census 2000 Brief*. Washington, DC: U.S. Census Bureau. Retrieved from http://www.census.gov/prod/2001pubs/c2kbr01-4.pdf

Hakuta, K. (1986). *Mirror of language: The debate on Bilingualism.* New York: Basic Books.

Hakuta, K., Goto, Y., & Witt, D. (2000). *How long does it take English language learners to attain proficiency*? *Policy Report 2000-1.* Stanford, CA: The University of California Linguistic Minority Research Institute, Stanford University. Retrieved from http://www.stanford.edu/%7hakuta/Docs/HowLong.pdf

Hanson, V. D. (2003). *Mexifornia: a state of becoming*. San Francisco: Encounter Books.

Heath, S. B. (1976). A national language academy? Debate in the new nation. *International Journal of the Sociology of Language, 11,* 9–43.

Hechinger, F. M. (1978). Political issues in education: Reflections and directions. In W. I. Israel (Ed.), *Political issues in education* (pp. 127–135). Washington, DC: Council of Chief State School Officers.

Hernandez-Chavez, E. (1995). Language policy in the United States: A history of cultural genocide. In T. Skutnabb-Kangas & R. Phillipson (Eds.), *Linguistic human rights: Overcoming linguistic discrimination* (pp. 141–158). New York: Mouton de Gruyter.

Huntington, S. P. (2004). The Hispanic challenge. *Foreign Policy* (no page numbers), March/April 2004. Retrieved March 14, 2004, from http://www.foreignpolicy.com

Johnson, L. B. (1965). *President Lyndon B. Johnson's special message to the Congress: The American promose. March 15, 1965. (As delivered in person before a joint session at 9:02 p.m.)*. Retrieved January 20, 2007, from http://www.lbjlib.utexas.edu/johnson/archives.hom./speeches.hom/650315.asp

Kloss, H. (1998). *The American bilingual tradition* (2nd ed.). Washington, DC: ERIC Clearinghouse on Language and Linguistics.

Kolankiewicz, L. (2000) *Immigration, population, and the new census bureau projections.* Washington, DC: Center for Immigration Studies. Retrieved from http://www.cis.org/articles/2000/back600.html

Lau v. Nichols., 483 F.2d 791 (9th Cir. 1973) rev'd 414 U.S. 563 (1974).

Lott, J. T. *Asian Americans: From racial category to multiple identities*. Walnut Creek, CA: AltaMira Press.

Ma, J. (2002). *What works for the children? What we know and don't know about bilingual education.* Cambridge, MA: Harvard University, the Civil Rights Project. Retrieved from http://www.civilrightsproject.harvard.edu/research/bilingual02/bilingual_paper02.php

Malone, N., Baluja, K. F., Costanzo, J. M., & Davis, C. J. (2003). *The foreign-born population: 2000, Census 2000 Brief.* Washington, DC: U.S. Census Bureau. Retrieved from http://www.census.gov/prod/2003pubs/c2kbr-34.pdf

Marr, C. J. (n.d.).*Assimilation through education: Indian boarding schools in the Pacific Northwest*. University of Washington Libraries: Digital Collections. Retrieved July 26, 2005, from http://content.lib.washington.edu/aipnw/marr.html

Marshall, D. F. (1986). The question of an official language: Language rights and the English Language Amendment. *International Journal of the Sociology of Language, 6,* 7–75.

Meyer, J. (2001). *Age: 2000, Census 2000 Brief.* Washington, DC: U.S. Census Bureau. Retrieved from http://www.census.gov/prod/2001pubs/c2kbr01-12.pdf

National Center for Education Statistics (NCES). (2003). *Status and trends in the education of Hispanics*. Washington, DC: U.S. Department of Education. Retrieved from http://nces.ed.gov/pubs2003/2003008.pdf

National Clearinghouse for English language acquisition and language instruction educational programs (NCELA). (2005). *NCELA FAQ No. 4: How does native language development influence academic achievement in a second language?* Washington, DC: National Clearinghouse for English language acquisition and language instruction educational programs. Retrieved from http://www.ncela.gwu.edu/expert/faq/04academic.htm

Ovando, C. J. (2003). Bilingual education in the United States: Historical development and current issues. *Bilingual Research Journal, 27*, 1–24.

Padolsky, D. (2002). *NCELA FAQ No. 5: What are the most common language groups for ELL students?* Washington, DC: National Clearinghouse for English language acquisition and language instruction educational programs. Retrieved from http://www.ncela.gwu.edu/expert/faq/05toplangs.htm

Padolsky, D. (2005a). *NCELA FAQ No. 1: How many school-aged English language learners are there in the U.S.?* Washington, DC: National Clearinghouse for English language acquisition and language instruction educational programs. Retrieved from http://www.ncela.gwu.edu/expert/faq/01leps.htm

Padolsky, D. (2005b). *NCELA FAQ No. 8: How has the English language learners (ELL) population changed in recent years?* Washington, DC: National Clearinghouse for English language acquisition and language instruction educational programs. Retrieved from http://www.ncela.gwu.edu/expert/faq/08leps.htm

Peal, E., & Lambert, W. E. (1962). *The relation of bilingualism to intelligence.* Washington, DC: American Psychological Association.

Perea, J. (1992). American languages, cultural pluralism, and official English. In R. Delgado & J. Stefancic (Eds.), *The Latino/a condition: A critical reader* (pp. 566–573). New York: New York University Press.

Portes, A., & Rumbaut, R. G. (2001). *Legacies: The story of the immigrant second generation*. Berkeley: University of California Press.

Ramirez, R. (2004). *We the people: Hispanics in the United States, Census 2000 special reports.* Washington, DC: U.S. Census Bureau. Retrieved from http://www.census.gov/prod/2004pubs/censr-18.pdf

Ramirez, R., & de la Cruz, G. P. (2003). *The Hispanic population in the United States: March 2002, population reports.* Washington, DC: U.S. Census Bureau. Retrieved from h*ttp://www.census.gov/prod/2003pubs/p20-545.pdf*

Ricento, T. (1995). *A brief history of language restrictionism in the United States*. Retrieved July 21, 2005, from http://faculty.coehd.utsa.edu/tricento/OfficialEnglish.htm

Ricento, T. (1998). Partitioning by language: Whose rights are threatened? In T. Ricento & B. Burnaby (Eds.), *Language and politics in the United States and Canada* (pp. 317–330). London: Lawrence Erlbaum Associates.

Rodriguez, C. M. (2001). Accommodating linguistic differences: Towards a comprehensive theory of language rights in the U.S.. *Harvard Civil Rights-Civil Liberties Law Review,* 36, 133–223.

Romaine, S. (2004). The bilingual and multilingual community. In T. K. Bhatia & W. C. Ritchie (Eds.), *The handbook of bilingualism* (pp. 385–405). Malden, MA: Blackwell Publishing.

Rumbaut, R. (1995). The new Californians: Comparative research findings on the educational progress of immigrant children. In R. Rumbaut & W. A. Cornelius (Eds.), *California's immigrant children: Theory, research, and implications for educational policy* (pp. 17–70). La Jolla, CA: Center for U.S.-Mexican Studies, University of California, San Diego.

Schildkraut, D. J. (2005). *Press one for English: Language policy, public opinion, and American identity*. Princeton, NJ: Princeton University Press.

Schmidt, R. (2000). *Language policy and identity politics in the United States*. Philadelphia: Temple University Press.

Sherzer, J. (1992). A richness of voices. In A. M. Josephy, Jr. (Ed.), *America in 1492: The world of the Indian peoples before the arrival of Columbus* (pp. 251–275). New York: Alfred A. Knopf.

Shin, H. B., & Bruno, R. (2003). *Language use and English speaking ability: 2000, Census 2000 brief*. Washington, DC: U.S. Census Bureau. Retrieved from http://www.census.gov/prod/2003pubs/c2kbr-29.pdf

Spolsky, B. (2004). *Language policy*. Cambridge, UK: Cambridge University Press.

Stritikus, T. (2002). *Immigrant children and the politics of English-only: Views from the classroom*. New York: LFB Scholarly Publishing LLC.

Suarez-Orozco, C., & Suarez-Orozco, M. (2001). *Children of immigration*. Cambridge: Harvard University Press.

Tarpinian, G. (2001). *Immigrants and the changing face of the U.S. working class.* Cornell ILR Roundtable. New York City, November 9. Retrieved June 5, 2005, from http://www.lraonline.org/immigration/Presentation-Nov%209.ppt#2

Thomas, W. P., & Collier, V. (1997). *School effectiveness for language minority students.* Washington, DC: National Clearinghouse for Bilingual Education. Retrieved from www.ncela.gwu.edu/ncbepubs/resource/effectiveness/Thomas-collier97.pdf

Thomas, W. P., & Collier, V. (2001). *A national study of school effectiveness for language minority students' long-term academic achievement*. Center for Research on Education, Diversity and Excellence. Retrieved from http://www.crede.ucsc.edu/research/llaa/1.1_final.html

Trueba, H. T. (1989). *Raising silent voices: Educating the linguistic minorities for the 21st Century*. New York: Newbury House. U.S. English. http://usenglish.org/inc.

V

LINGUISTIC PRINCIPLES AND APPLIED PERSPECTIVES

Chapter 11

Linguistic Contributions to Bilingualism

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These are some facts about people who speak a second language:

1. People's pronunciation of sounds like /t/ and /d/ in their first language is affected by the other languages that they know. You can tell whether a French person speaks English by their accent in French.
2. Second Language (L2) learners rapidly learn the appropriate pronunciations for their own gender. For instance, while women L2 learners of English tend to pronounce the *–ing* ending of the continuous form *going* as /In/, men tend to use /In/.
3. Ten days after brain injury from a road accident, a bilingual Moroccan could speak French but not Arabic; the next day Arabic but not French; the next day she went back to fluent French and poor Arabic; three months later she could speak both.
4. Five-year-old Bengali children in the East End of London learn the regular spoken past tense endings /t/ *learnt* and /d/ *played* before the ending /Id/ *waited*. People acquire the elements of a second language in a fixed common order.

This chapter tries to show how linguistics may help or hinder us from explaining some of these apparent facts. It goes over some of the ways that linguistics has been used in second language acquisition (SLA) and bilingual research, ranging from overall linguistic theories to research techniques, and evaluates the relationship between linguistics and second language acquisition research.

Introduction

The people who study the acquisition and use of languages other than the mother tongue come from a variety of backgrounds. Some are linguists concerned with testing out the latest linguistic theory. Some are psycholinguists concerned with the processing and use of second languages. Others are teachers trying to establish the best basis for language teaching. Some call themselves applied linguists, some SLA researchers, and some bilingual researchers. All of these have their own traditions for thinking about language and feel uncomfortable with the world view of the others; some linguists dislike what they perceive as the psychologists' view of words as coins with two faces, one inscribed in each language; some psychologists cannot fathom why linguists are so interested in the invisible minutiae of syntax or grammar such as past endings; some teachers deplore the lack of practical applicability of both camps to the multifaceted classroom situation. In an ideal world, the discipline of linguistics would set out the nature of language in general and would describe individual languages in particular. Linguists would provide maps of the different aspects of language from phonology to semantics, which could then be appropriated by those who want to study the use and acquisition of more than one language. In that the domain of linguistics is language itself—the actual subject matter that the others are drawing on for their own purposes—it should have a role in any discipline concerned with language. Just as you go to a geologist to find properties of land, so you would go to a linguist to find properties of language.

We can start with a quotation from the eminent linguist Roman Jakobson (1953) who claimed that "bilingualism is for me the fundamental problem of linguistics." On the one hand this reassures the researcher of the importance of their area; on the other hand it is a warning that linguists see bilingualism as a problem, an exception to the rule of monolingualism rather than the normal condition of human beings. Indeed, Chomsky (1986) wrote that "the pure idealized form of language knowledge should be the first object of study rather than the muddy waters of bilingualism." He has always tended to see bilingualism as an unnecessary complication for his theories. By and large, linguists implicitly believe that the monolingual native speaker is the norm: "From Saussure to Chomsky 'homo monolinguis' is posited as the man who uses language—the man who speaks" (Illitch & Sanders, 1988, 52). L2 users are defined in relation to monolingual native speakers, not as a type of human being in their own right. The acceptance of this assumption has tended to separate SLA researchers from bilingualism researchers, who usually reject it, resulting in a major fissure in the field of SLA research. Whenever linguistics is drawn on for SLA research, it must be remembered that it is not neutral, but takes a position about the relative unimportance of second language acquisition as opposed to first language acquisition and makes a number of other implicit assumptions, as we shall see.

Comparing Linguistics and SLA Research

As a quick way-in let us see whether linguists and SLA researchers share the same idea of language by comparing the weighting given to particular areas in linguistics and SLA research sources. The *Blackwell Handbook of Linguistics* (Aronoff & Rees-Miller, 2001) provides a useful source for linguistics. Its chapter headings deal with inter alia such technical linguistic areas as phonetics, phonology, morphology, the lexicon, semantics, syntax, pragmatics, discourse analysis, sociolinguistics, neurolinguistics, and, indeed, second language acquisition. An adequate account of linguistics, as represented on, say, an undergraduate degree course in linguistics, could hardly omit any of these. And surely neither could an adequate account of second language acquisition.

Somewhere all these areas play their part in the second language. Our introductory examples for instance require answers involving the areas of phonetics (how people pronounce /p/ etc.), sociolinguistics (how the /In/ pronunciation of *–ing* goes with a particular social grouping), neurolinguistics (how brain damage affects language), and morphology (how the past tense *–ed* is pronounced in three different ways).

Representative sources for SLA research can be Rod Ellis's (1994) 824 page *The Study of Second Language Acquisition* (henceforward *SoSLA*) and the second edition of Josiane Hamers and Michel Blanc's 468 page state-of the art *Bilinguality and Bilingualism* (henceforward *BaB;* Hamers & Blanc, 2000). The only area of linguistics that appears to be missing from the SLA contents list and the indexes of *SoSLA* and *BaB* is phonetics. *SoSLA*, and most SLA books, use morphology to refer to grammatical morphemes—the function words like *to* and inflections like past tense *–ed*—not to the wider discipline concerned with the structure of words that is found in linguistics. The vocabulary store called the lexicon, crucial to linguistics, is reflected in the SLA sources only in *lexical errors* and *lexical phrases*, not through how words are related to each other. The meanings of words, covered in semantics in linguistics, is barely touched on in SLA research; neurolinguistics, too, is mentioned only in the context of age. In *BaB* the major linguistic area of syntax—the way sentences are structured grammatically—is not referred to except in the context of *syntactic processing*, though *grammar* occurs on a handful of pages.

Do the main descriptive categories used by the *Handbook* occur in the L2 sources? The *phoneme* (the minimal sound difference between pairs of words such as *bang* and *pang*, crucial to many phonological analyses in linguistics) is mentioned only in passing, in *SoSLA* in connection with coding ability; the *allophone* (the nonsignificant difference between say the two *l's* in *lip* and *pill*, an important feature of foreign accent) is not mentioned in either book as a phonological term, nor is the *vowel* apart from the context of infant acquisition. The *sentence*—the major unit in virtually all syntax in linguistics—is barely mentioned; *grammatical gender* (the difference between *she* and *he* in English)—a major element of syntax that differs very much between languages—is absent, as is *tense* (another vital area covering present *he goes* versus past *he went* versus tenseless *to go*). The major types of word for linguists are hardly mentioned: the *verb* is briefly mentioned in *SoSLA*, but not in *BaB,* and the *noun* occurs in *SoSLA* only in *noun phrase* and does not exist in *BaB*. The overall linguistic term *lexicon* for vocabulary occurs in both books, but the more detailed terms *lexical item* (a unit of vocabulary, which may be a word *look* or a phrase *look up to*), *collocation* (how some words go together so that *strong* goes with *tea* but not *car*, while *powerful* goes with *car* but not with *tea*), or indeed the general idea that there are structural relationships between words such as synonyms and antonyms are not discussed. The all-pervasive linguistic term *feature—distinctive feature* (i.e., the features that distinguish /p/ from /b/ of voicing and aspiration), *semantic feature* (i.e., the meaning difference between *boy* and *girl*, *fox* and *vixen*)—is absent from both SLA books.

This brief survey highlights how little overlap there is between linguistics and the orthodoxies of SLA and bilingual research. Obviously there are exceptions in the form of linguistically based studies of L2 syntax such as Hawkins (2001) or of L2 phonology such as Archibald (1993). The lack of interest in whole areas of linguistics in the SLA introductions nevertheless gives a fair picture of much SLA research. On the face of it, the SLA research mainstream is unrelated to the core concerns and categories of linguistics. Whatever the *L* in SLA research stands for, it is not language in the linguist's sense, for good or for ill. Perhaps you do not have to know the theory of the internal combustion engine to measure a sparking gap, but you do at least have to be able to recognize a sparking plug when you see one.

Views of Language and Views of Second Language Acquisition

What researchers think language is dictates their views about how people acquire it. If you conceive of language primarily as behavior—things people do in the visible world, such as greeting each other or signing contracts—they learn patterns of behavior by actually behaving. If you think of language chiefly as knowledge—invisible ideas in the mind, people planning their day or deciding what to have for supper—they learn abstract rules and items through mental processes. If you think of language as social interaction—how people relate to each other in society, whether as customers or boyfriends—they learn by interacting with their parents and caretakers. And these are only three of the many possible positions. It is like looking at a landscape from the viewpoints of a geologist, a landscape painter, and a farmer: the observer's purpose dictates what is seen.

Hence one problem with relating linguistics to other disciplines has been the sheer multiplicity of linguists' views and the amount of time they spend ridiculing those who do not share them. Relating linguistics to L2 acquisition and use necessitates first of all defining what one means by linguistics (i.e., which school or theory is supported). A reviewer of *Linguistics and second language acquisition* (Cook, 1993), for example, argued that linguistics meant linguistic theory and that there was only one tenable linguistic theory, namely the generative (Gregg, 1995). But linguistics is about many things, not just linguistic theory (imagine music being defined as music theory), in particular description of languages; there are in any event many linguistic theories, not just one, and generative theory is now the possession of a specialized minority of linguists. Above all, science should attempt to explore all avenues rather than just one (Feyerabend, 1975). Language is multifaceted and needs multiple approaches.

As language is involved in every aspect of human life, nonlinguists also have strong opinions about it, sometimes echoing those of linguists, sometimes not, mostly reflecting the bygone traditions of school grammar teaching. The mass media for instance display prescriptive attitudes to language almost every week, regarding wrong spelling and grammar as moral turpitude. This chapter only touches on a few of the types and areas of linguistics that have been used in SLA research.

Since two or more languages are involved in SLA research, the same type of linguistics needs to be implemented for two language systems. This might mean resorting to descriptive techniques that encompass all languages, say the inventory of all the sounds that can occur in human languages or universal theories that apply to all languages with specified parameters of variation. More often the SLA researcher has the task of reconciling two languages described with linguistic approaches that differ to a greater or lesser degree.

Competence and SLA

Since Chomsky (1965) first divided linguistic competence (the knowledge of language of the idealized native speaker) from performance (the actual concrete use of language), it has been axiomatic that all normal adult human beings have linguistic competence in their first language—competence is indeed defined as whatever it is that native speakers possess; *any* native speaker can then stand for *all* native speakers. All children, with rare exceptions, succeed in learning their first language over roughly the same period of time—they become native speakers. They do so in a language environment the properties of which are familiar to everyone, and are usually surrounded by a small cast of parents and other caretakers. Research into L1 acquisition tries to see how the child reaches a destination that is relatively constant.

L2 acquisition, however, has no settled final linguistic competence, common by definition to all, or even most, learners. Few L2 learners acquire a native-like competence in the second language. Their final state ranges from near beginners able to say a few L2 words in a classroom to writers of world-class literature, say Conrad or Nabokov. There is no standard L2 learner or L2 user in the sense that there is a standard native speaker. The environment of L2 learners varies immensely, say from schools to refugee camps, compared to the primal family child-rearing situation. The age of L2 learners also varies from early childhood to old age, unlike the lock-step development of age and L1 acquisition. Rather than being typical of all human beings, L2 learners and users are a far from random selection, chosen by education, migration, job needs, and many other factors. SLA research has to describe multiple routes to diverse destinations rather than the single route to the same destination of L1 research.

A major concept in SLA research has been interlanguage—*the existence of a separate linguistic system* (Selinker, 1972) in the L2 learner's mind from the L1 and the L2. This is clearly derived from the Chomskyan notion that linguistic competence is whatever it *is* rather than reflecting what it is *not*. This has been called the *independent grammars assumption* (Cook, 1993); children are not failures for not speaking like adults, but children in their own right with competences of their own. L1 researchers such as McNeill (1966) indeed tried to write grammars for particular points of development, say the grammar of the two-year-old as an independent system. Interlanguage took this concept over into SLA research, insisting that the first goal of SLA research was to describe the L2 learner, not to evaluate how they mangle native speaker language. This has remained an implicit part of SLA research that is seldom questioned. It is now partly subsumed by the multicompetence idea that interlanguage is only one factor in the L2 user's total language system, which encompasses both the first language and the interlanguage (Cook, 2002).

Overall Views of Learning

Linguistics has in its time spawned a multitude of theories of L1 acquisition, some coming directly from linguistic theories such as Chomsky's Universal Grammar (UG) which sees the knowledge of language as consisting partly of innate language principles, partly of limited variation and masses of lexical items that have to be learnt. Others are spin-offs from psychological theories such as ACT* (Anderson, 1983) that see language acquisition as a process of automatizing large amounts of language information called declarative knowledge into a set of procedures, called procedural knowledge. So it is hard to speak of a unified linguistic approach to L1 acquisition that can be transferred to L2 acquisition. L2 approaches have borrowed all the way from say the UG model (White, 2003) to ACT* (Dechert, 1984). Inasmuch as linguists agree about anything, it is probably nowadays no more than the assumption that language is a complex system of its own, hence lining themselves up against psychological theories such as ACT* that believe in using the same learning and production processes as any other skilled activity. Hence linguists typically insist that a specific account of language acquisition is needed rather than an extrapolation to language from general theories of human learning such as connectionism. The response from psychologists is often on the lines of *well they would, wouldn't they*? If language is not distinct, linguists don't have a role of their own in the academic community.

The division between external (E)-language and internal (I)-language (Chomsky, 1986) provides a useful broad categorization of two distinct ways of approaching language, language learning, and research methodology. E-language is the actual occurrence of sentences et cetera, in the world outside, whether as conversation, newspapers, or whatever; I-language is the knowledge

of language stored inside a person's mind. Phrased in terms of L2 acquisition, the data for an E-language approach is naturally occurring samples of learners' language whether tape recordings, e-mails or whatever; these are analyzed to see the patterns, frequencies, and regularities in people's processing; what people do is established chiefly from example of what they have done. The data for an I-language approach might be grammaticality judgments (asking people to judge whether sentences are grammatical, acceptable and so on), reaction time measures (timing how long people take to respond to various L1 and L2 stimuli), and many others, designed to test hypotheses about what they know; knowledge of the language is established by indirect means, not necessarily from things they actually say. This I-language versus E-language distinction is all pervasive in SLA research, as we shall see.

SLA Theories Derived from Linguistics

Some SLA research shows its origins in linguistics fairly obviously, particularly when it is associated with older forms of linguistics.

Contrastive Analysis

A classic E-language approach to L2 acquisition was Contrastive Analysis (CA), both in the European schools described in Sajavaara (1981) and the American school exemplified by Lado (1957). Linguistics provided descriptions of two languages; the differences between the two descriptions are taken to be the major contribution to the learners' difficulties with the second language, as in Stockwell, Bowen, & Martin's (1965) comparison of English and Spanish.

Linguistic description was then the main driving force. In syntax this took the form of phrase structure grammar through which the relationship between the L1 and the L2 could be stated in two-dimensional syntactic trees or in the columns of substitution tables. In phonology it was phoneme theory, particularly the tool of minimal pairs *bit*/*bat* et cetera, which treated speech as a succession of discrete sounds in a chain. Most language teaching has used these approaches to syntax and phonology ever since, presumably because they are straightforward to apply.

American CA also relied on the structuralist learning theory of Bloomfield (1933) and his followers. To Lado (1964), for example, speakers control habits that produce speech automatically without thinking; these are acquired through exposure and practice; habits learned for one task are transferred to new tasks or may interfere with them. The learning model is thus a form of behaviorism relying on frequency of occurrence and on imitation. As such its modern developments do not come within the scope of this chapter. The term *behaviorism* has been a red rag to a bull to linguists ever since Chomsky's elegant demolition of behaviorist approaches to language in his celebrated review of B. F. Skinner's *Verbal Behavior* (Chomsky, 1959). Linguists do not consider that it matters how often you say something and deny that rules could be learned by imitation. Nevertheless such approaches have continued to be developed in psychology, as seen for example in *The New Psychology of Language* (Tomasello, 1998).

Since SLA research is about minds with two languages, the relationships between these languages, both in the learner's development and in their final state of knowledge inevitably have to form a major part of its domain. The concept of transfer from one language in the learner's mind to the other is then necessary in one shape or another; for instance Spanish learners may transfer the Spanish sentence structure to English to get subjectless sentences *is raining* and may transfer

Spanish syllable structure to get *eschool* by adding an initial vowel. The danger with terms such as transfer and interference is, however, their negative associations with this largely discredited CA theory. Whatever the terminology or theory that are used, the relationships between the two languages that they denote stand at the center of SLA research. If the L2 and the L1 were entirely separate in the mind, there would indeed be no separate discipline of SLA research as L2 acquisition would be a special case of L1 acquisition.

Universal Grammar and SLA

Since the 1950s Chomsky's I-language theories have been crucial to linguistics, whether people react for or against them. Chomsky emphasized how the individual mind created knowledge of language from the evidence available to it, conceptualized first as a Language Acquisition Device (LAD) that produced knowledge of language in the child's mind, then as Universal Grammar (UG) having invariable principles that govern the structures of all languages and variable parameters that are set differently for each language (Chomsky, 1986), currently rephrased as the Minimalist Program (MP; Chomsky, 1995), which has reduced language knowledge to an even sparser set of principles.

UG theory had the advantage for SLA research in that it treated all languages as variations on a theme, called by Rizzi (2004) *comparative syntax*, rather than languages varying indefinitely from each other as they often seemed to do in structuralist theories. It automatically provided an overall framework within which the L1 and the L2 could be compared. For example the null subject parameter distinguishes languages like English where the pronoun subject of the sentence is compulsory from those like Spanish where it is not. So in English you have to say *he talks*, not *talks*; in Italian you typically say *parla* without a subject rather than *il parla*. But it isn't just English and Italian that this applies to: all languages have to choose whether to be like English or Italian, even if the majority adopt the Italian solution. This neat difference between languages has provided a useful tool for SLA research and has been a favorite topic from White (1986) to say Tsimpli, Sorace, Heycock, & Filiaci (2004).

UG theory also had the bonus of providing its own learning theory through its claims that much language knowledge is already built-in to the mind and that input simply activates it in circumscribed ways by setting parameters for the particular language and providing vocabulary. It is then an I-language theory that takes the individual mind as its model. But, unlike CA, it is primarily a theory of monolingual L1 acquisition, with SLA studies mostly riding on the back of the L1. The debates about UG in SLA research have centered on whether it can be extended to L2 acquisition—is there "access" to UG in L2 acquisition (Cook, 1985a; White, 2003)?—and whether its properties suit one version or another of contemporary syntactic description (Hawkins & Chan, 1997), rather than proposing distinct SLA research questions of its own.

Distinctive L2 Views

In addition to the broad CA and UG approaches discussed earlier, which import a linguistic movement into SLA research, lock, stock and barrel, there have been, more specifically, L2 models that have drawn on linguistics to some extent.

Krashen's Input Hypothesis Model

Krashen's theory of second language acquisition reached its full form in the Input Hypothesis of the 1980s (Krashen, 1985). Its main claims were the division between acquisition—the "natural" implicit process of acquiring a language—and learning—the formal explicit learning of language, available to older learners. Its linguistic antecedents were largely Chomskyan in its reliance on the inherent capacity of the human mind to acquire languages, but it concentrated on the conditions that fostered or hindered successful attainment rather than making suggestions how this worked. Indeed it is anathema to Chomskyan theory to claim that specific conditions are necessary for language acquisition: virtually all children learn language despite the inefficiencies of their parents; the only thing that can harm them is lack of any language input at all.

The Krashen view of language partly comes out of 1960s L1 acquisition research, which in turn derived rather remotely from linguistics. For instance, SLA research took over the concept of grammatical morpheme from the first language work of Brown (1973). Brown selected an eclectic and arbitrary selection of so-called *grammatical morpheme*s consisting of aspects of the inflectional morphology of the verb (progressive *–ing*), and the noun (possessive *–s*) mixed with articles (*the* and *a*) and others, and scored how well children produced them over the first years of life, establishing a common order for their acquisition.

A massive amount of SLA research was devoted to testing this out in second language acquisition, starting with Dulay and Burt (1973) who found that there was indeed an order of difficulty for these grammatical morphemes for Spanish-speaking learners of English. The easiest was the plural *s* in *books*, followed by the continuous *ing* in *going*; the most difficult the third person *s* in *likes* and the possessive *s* in *John's.* Similar orders were found for L2 learners of English whether they came from Japan or from Italy, and whether they were taught English or learned it informally. The study of sequences for the acquisition of grammatical morphemes is still alive, with Hannan (2004) using it to show a similar sequence for Bengali-speaking children in East London and Wei (2000) using it to compare Japanese and Chinese learners of English. It remains the only aspect of morphology to be covered to any extent in SLA research; a meta-analysis of selected studies can be fund in Goldschneider and DeKeyser (2001).

One of the planks of the Input Hypothesis Model was the Natural Order Hypothesis (Krashen, 1985), based on this research: the rules of language are necessarily acquired in a particular order. This has remained a persistent and virtually unchallenged claim about second language acquisition to this day for many theories and many areas of acquisition. The problem with Krashen's version is partly that it is based on a limited set of syntax, mostly that no real reason is provided why the order is necessary. It cannot be, for example, that the natural order for English grammatical morphemes is an innate part of the mind as this would mean that *ing* and *s* and the rest are built-in to the brain, rendering other languages impossible to learn. It must be that these are covered by more general principles at an abstract level.

European Models

European SLA research often took a different turn under the influence of the long-standing European tradition of linguistics typified by de Saussure (1916/1959) and Halliday (1985), known as functionalism. In these theories the meaning and function of the sentence and its contribution to

social exchange and communication are seen as more important than its sheer structure. It is how people use language in the real world that matters.

One example is the large-scale research program involving six first languages and five second languages known as the ESF (European Science Foundation) project. This regarded the interlanguage as based on a set of organizational principles—phrasal (how words are put in structures), semantic (how one referent in the sentence controls another) and pragmatic (how each sentence answers an implied question; Klein & Perdue, 1997). Large-scale research with adult migrant workers in Europe unearthed a basic grammar common to all L2 learners consisting of three simple rules, namely, a sentence may consist of: a Noun Phrase followed by a Verb, optionally followed by another Noun Phrase *girl take bread*; or of a Noun Phrase followed by a copula and another NP or an adjective *it's bread*; or of a verb followed by a Noun Phrase *pinching its*. And that's it, so far as the basic L2 grammar is concerned. This is true almost regardless of which first or second language is involved. L2 learners not only have an interlanguage grammar, they all have the *same* interlanguage grammar.

An alternative approach, first called the Multidimensional Model (Meisel, Clahsen, & Pienemann,1981), also looked beyond statements of order to underlying explanations. It had at its core how the order of sentence elements such as Subject, Verb, and Object is modified by syntactic movement that displaces the elements of the sentence to other places, familiar from the formation of passives *Poland was invaded by Germany* (*Germany invaded Poland*) and questions *which country did they invade*? (*they invaded which country*). First the L2 learners progressed from saying one word or phrase, say *ticket* to using the most typical word order for the language, say Subject Verb Object *you buy ticket*. Then they went on to modify this basic structure by moving elements around in the sentence to get say *yesterday I buy ticket* before acquiring the question movement *which ticket do you want?* Finally, they get the order in subordinate clauses *he asked which ticket I wanted*. These stages of development were caused by the constraints of language processing, starting from the minimal single-word sentences people could handle and expanding to encompass more and more complex movement as their processing capacity allowed. This explanation based upon the capacity to move elements in the sentence evolved into the Processability Model (Pienemann, 1998), though the syntax became more rigorous, based on the ideas of Joan Bresnan (2001) known as Lexical Functional Grammar.

Using Different Areas of Linguistics

Sometimes SLA research has not just taken its cue from linguistic theories but has also taken over descriptive techniques used by linguists from different traditions. The danger is that such tools are seldom neutral but can commit SLA research to a particular view of language and language acquisition. The phonological descriptions used in CA were, for example, based essentially on a description of the phonemes and allophones used in the phonological theories of the 1950s rather than more modern ideas. These continue to be tools in much SLA research, but SLA researchers have to be careful about the underlying structuralist assumptions about language learning that they might well not wish to take on board. Furthermore, the tools of linguistics, being designed to handle the monolingual native speaker, may not properly cover L2 acquisition appropriately, as we elaborate in the following section. Let us then see two mainstream uses of linguistic apparatus in the service of SLA research: phonology and sociolinguistics.

Phonetics and Phonology in SLA Research

A particular close link between phonetics and SLA research has been the measurement of Voice Onset Time (VOT), an aspect of phonetic variation between languages that lends itself well to precise measurement and experimentation reviewed in Watson (1991), going from say Williams (1977) to Kehoe, Lleo, and Rakow (2004). VOT refers to the timing of voicing in the production of plosive consonants such as /p~b/, /t~d/, and /k~g/. Plosive consonants are made by completely closing some part of the mouth with or the lips and so preventing air from coming out; then the air is released, giving *plosion*. Plosives may be either voiced like the /g/ in *got* or unvoiced like the /k/ in *cot*. But whether we perceive them as voiced depends, not just on the vibration of the vocal cords, but also on when voicing starts. Using the moment of release of air from the obstruction the tongue caused by as a reference mark, voicing can start *before* the release, *shortly after* the release, or *some time after* the release, deciding whether a plosive is voiced depends on the length of the silent gap between the release and the start of voicing—the Voice Onset Time. In the voiced English /g/ in *gut* the voicing starts anytime between 88 milliseconds (ms) before the release and 21 ms after; in the voiceless /k/ in *cut* the voicing starts abut 80 ms after the release. The difference is then at least 60 ms.

While there are pairs of voiced and voiceless plosives in many languages, the VOT difference between the voiced and unvoiced forms varies from one language to another. For example, the voiced Spanish /g/ has an early VOT of 88 ms before the release, similar to English, but the voiceless Spanish /k/ has a VOT of 29 ms shortly after the release. While both languages have a pair of voiced and unvoiced consonants, there is quite a difference between them in the timings; the Spanish /k/ starts voicing much earlier than its English counterpart /k/, almost within the range for the English /g/. Hence acquiring the pronunciation of a second language may involve not just learning the overall contrast between pairs of plosive consonants but also altering the perception and production of VOT.

A long tradition of SLA experiments dealing with multiple language pairs has shown that L2 learners neither match the target language VOTs fully nor retain their first language VOTs completely. Thus L2 learners end up differing from monolingual speakers of both L2 *and* L1. This is supported by research ranging from Spanish/English (Zampini & Green, 2001), Hebrew/English (Obler, 1982), and German/Spanish (Kehoe et al., 2004)). Indeed some of the original phonetics research may give a false impression of monolinguals: Kato (2004) has pointed out that the supposedly monolingual VOTs often come from bilingual subjects tested in their L1 and hence may have already been influenced by the L2.

The VOT area then shows the close relationship that can arise between linguistic techniques and SLA research, more or less independently of the linguistic theory that they were originally attached to. Other tools used in phonetics are also starting to have an impact. For instance, Event Related Potentials (ERP) show carryover of perception of vowel duration from Russian to Finnish L2 for Russian-similar vowels but not for dissimilar (Nenonen, Shestakova, Huotilainen, & Näätänan, 2005). Analysis of speech intonation in terms of fundamental frequencies showing how the pitch goes up and down have demonstrated the effects of L2 Greek on location of intonational peaks in L1 Dutch questions (Mennen, 2004) and of Turkish on intonation by Turkish/German bilingual children (Queen, 2001). Such techniques are used by experimental phoneticians such as Flege (1990) and Major (2001) to support a number of theories of L2 phonological development. VOT is a highly testable area of phonetics in SLA research; the problem is whether techniques such as VOT have much to say for other aspects of phonology, let alone L2 acquisition in general. Nevertheless they do show that SLA research has progressed beyond the concept of the phoneme.

And they show how second language research can usefully borrow research techniques from linguistics without being overwhelmed by them.

Sociolinguistics in SLA Research

SLA research has also drawn on sociolinguistics, in particular on the kind called variationism. This concerns itself chiefly with the varying pronunciations of different social groups, such as Labov's famous study of the pronunciation of /r/ by department store staff in New York (Labov, 1966) and Trudgill's account of women using the more upwardly mobile /In/ pronunciation of *–ing* versus men using the downwardly mobile /In/ pronunciation (Trudgill, 1974), arguably a worldwide phenomenon in English-speaking countries. The sociolinguistic techniques for investigating different native groups can then be extended to L2 learners. Take the variable pronunciation of the *–ing* verbal ending. Not only is the /In/ pronunciation used by men rather than women, but also by working-class speakers rather than middle-class speakers, and in informal circumstances rather than formal, as shown by the spelling variant <in'> in advertising campaigns for whisky <*a sippin' whiskey*> and for fast food <*i'm lovin' it*>. L2 learners soon learn the gender bias; male L2 students tested by Adamson and Regan (1991) say /In/ four times as often as female students.

More recently Rehner, Mougeon, & Nadasdi (2003) applied variationism to the acquisition of French pronouns by English-speaking students in Canada, showing that they preferred the more formal first person pronoun *nous* to the informal *on* compared with both native speakers and their own teachers. Cook (1985b) similarly found that L2 learners preferred more formal forms of thanking such as *thank you very much indeed* over informal forms such as *thanks*. So far the variation that has been studied by SLA researchers has been matching variants established from native speaker norms; that is, there is very little research dealing with variation between the situations, people and so on among L2 users rather than native speakers, apart perhaps from the variable of contact with native speakers, say in year-abroad studies (Regan, 1996; but see Dewaele, 1994, 2004; Dewaele & Regan, 2002). The danger is seeing the L2 learner as being deficient compared to the native speaker; it may be that extra formality, for instance, is expected of nonnative speakers and so is the correct thing for them to do while talking with native speakers.

SLA research has extended its sociolinguistics methodology in several directions. One is the social network theories used in Li Wei's (1994) study of the Chinese community in Newcastle, concerned with the varying contacts that members of a minority group may have with the majority community. Another is the notion of power—how one group controls another group through language. Partly this may be a matter of the power relationships between different language groups in a multilingual society such as Singapore, which has English, Chinese, Bahasa Indonesia, and Tamil, or Northern Ireland which has English and Ulster Scots, or in the United States with the English Only movement. At an overall level the issue has became one of native speaker power: do native speakers have the sole rights over a language (Rampton, 1996; Cook, 1999)? L2 users have rights as second language users in their own right, not just according to the extent to which they accommodate to native speakers.

Perhaps the main contact areas between linguistics and SLA research have been syntax and vocabulary. Syntax of various types underlies much of the previous discussion, whether Universal Grammar, the ESF project, or the Input Hypothesis Model. Syntax and vocabulary have not been expanded here at length mostly because they are well-covered in books such as *SoSLA* and Nation (2001). But also much syntactic discussion in SLA research has now become a test of linguistic theories from L2 data rather than SLA research that uses linguistics and so not part of SLA

research proper; much work with vocabulary is based on ideas from psychology or testing rather than linguistics.

The Methodology of SLA Research

The I-language versus E-language division runs through the methodology of SLA research. Some researchers are interested in naturally occurring samples of language, say tape recordings of L2 learners' speech, their e-mails, their essays, or indeed any other source of spoken or written language produced by L2 learners—classic E-language data. From these different types of text, we can derive regularities, frequencies, and so on for what happens in L2 users' speech, as in say the ESF analysis of corpora (Klein & Perdue, 1997). Other researchers employ I-language approaches such as reaction time experiments, grammaticality judgments and the like to find out what the L2 user knows rather than what they have done (Yuan, 1997). In practice this distinction may be blurred: the fact that a learner has written something may be used to show both E-language frequency and I-language knowledge. Nevertheless the difference in orientation is there, E-language seeing its main responsibility as the faithful reporting of what has already occurred, I-language as accounting for what the user might potentially say.

The I- and E-language division is also sometimes at cross-purposes with the competence/performance distinction; do grammaticality judgements count as competence (i.e., underlying knowledge of the language) because they involve knowledge or as performance (i.e., processes involved in using language) because they are established by a process task? Corpora data such as the L2 students' essays in the *Longman Corpus of Learner English* clearly reflect the analysis of performance—what learners have actually said. Experimental studies of reaction times are equally obviously measures of performance—how learners do something. In between comes a grey area where performance data such as grammaticality judgements are used to say something about competence. Some people, mostly from the psychological wing, deny that the competence/performance distinction is necessary. Others pay it lip service, say by accepting grammaticality judgments as evidence for underlying knowledge without taking in the processes they use.

In a sense, the use of grammaticality judgements is an extrapolation from the linguists' idea of linguistic intuition, prevalent from Chomsky (1957) onwards. Linguists usually ask themselves whether a single sentence such as *Is Sam is the cat that black?* is grammatical and get a yes/no/don't know answer; their intuition depends on self-assessment of a sentence or two. SLA researchers ask many subjects to judge many examples of the same structure and establish a frequency of scores rather than an absolute answer. The linguistic intuition method of the linguists then seems much closer to a single sentence competence mode, the SLA researchers' grammaticality judgements test to a experiment-based approach: linguists rarely give the statistical significance of their intuitions, SLA researchers almost invariably do for their grammaticality judgements. The trap that SLA research sometimes falls into is comparing the intuitions of native speakers with the grammaticality judgements of L2 learners; however good their intuitions, native speakers are very far from perfect at grammaticality judgement tests even in areas where their grammatical structure seem well attested in their competence, say *John is easy/eager to please*. The only valid comparison is like with like—L2 grammaticality judgements compared with L1 grammaticality judgements, or L2 intuitions compared with L1 intuitions. The latter is interestingly never done for the reason that researchers cannot readily admit that L2 users have valid intuitions, since native speakers are the gold standard from which L2 users depart.

Questioning Linguistic Ideas in Second Language Acquisition Research

The use of grammaticality judgements in SLA research can then be seen as a potentially misleading reinterpretation of a concept from linguistics. This section argues that this reflects a more general problem when SLA research takes over other core assumptions from linguistics. While such assumptions are not necessarily wrong in their original context, they may not be appropriate for SLA research, particularly when they are axiomatic rather than derived from theories or descriptions of language.

The Dominance of Speech

Throughout linguistics it is assumed that speech is the primary form of language, writing a secondary derived form, whether it is Aristotle from the fourth century BCE asserting *writing is a symbol of vocal sounds* (as cited in Harris, 2000) or Lyons from the twentieth century CE claiming that "writing is essentially a means of representing speech in another medium" (Lyons, 1968, p. 38) or the founding father of American linguistics Bloomfield insisting, "Writing is merely a way of recording language by means of visible marks" (Bloomfield, 1933, p. 21). Yet written language affects our lives in many ways that spoken language does not; its advantages of permanency, density of lexical content and neutrality of social roles for reader and writer are precisely that it is *not* spoken language (Cook, 2004). Once we have learned to read, few of us read aloud, except for newsreaders or parents: we don't necessarily convert what we read into speech, but use the different technique of silent reading. English people read entire novels by Dostoyevsky or J. R. Tolkien where they cannot pronounce the names of the characters. Far from being dependent on spoken language, written English differs in grammar and vocabulary as well as in the unique systems of punctuation and spelling; Haas (1970) indeed talked of the relationship between speech and writing in terms of translation between languages. For literate people, speech and writing are in parallel rather than writing being a slave system. The arguments for the primacy of speech have little to do with our everyday experience. Of course written language does slip in to linguistics by the backdoor; every time Chomsky cites a sentence such as "John said he was looking for a cat, and Bill did too" (Chomsky, 1995, p. 126), he, like all linguists, is surreptitiously relying on our knowledge of left-to-right direction, word spaces, capital letters and punctuation—the sentence would be ungrammatical if <*Bill*> were all in lower case <*bill*>.

Since the 1880s language teaching has adopted the same creed of speech being prime. This was seen explicitly in the Direct Method, which started in the later nineteenth century and was characterised by its emphasis on spoken language. It was most extreme in the audiolingualism of the mid-twentieth century, which emphasized the spoken language so much that it banned the written word from the first stages of second language learning (Lado, 1964). It survived implicitly in the recent communicative language teaching approach or indeed the contemporary task-based learning method: these emphasize the importance of spontaneous communication in the classroom, but see such communication as essentially through speech rather than writing; the written language is used in teaching as an aid to the spoken language rather than as a major component in its own right—"The literature on tasks, both research-based or pedagogic, assumes that tasks are directed at oral skills, particularly speaking" (Ellis, 2003, 6). Contrastive Analysis was based on comparison between the L1 and L2 phonologies, as in Stockwell et al. (1965), not between

writing systems; learner errors to be analyzed were spoken, not written; sequences of acquisition were based on speech data, not written (Dulay & Burt, 1973), and so on.

SLA research has then adopted this spoken language bias almost without question, leading to the dominance of the spoken language over the written. SLA research has throughout used the notion of the *lexical sentence* from spoken language with its *complete* grammatical structure rather than that of the *textual sentence* with its *incomplete* sentence fragments (Cook, 2004). But again the messages are mixed: Bigelow and Tarone (2004) point out that virtually all SLA research has concerned learners and users who are already literate and whose minds and lives have therefore been transformed in all sorts of ways by literacy itself. This is particularly dangerous when investigating the question of success in L2 acquisition being related to the age of the learner; younger learners will either be nonliterate or learning literacy; older learners will mostly be literate—those who are not will probably be untypical of the rest of the community because of isolation or learning disability. Hence it may be impossible to disentangle the two effects of age and literacy.

Why should speech be more important than writing in SLA research where literate L2 users are concerned? It is irrelevant for L2 acquisition that children acquire their first language before their first writing system or that speech comes historically before writing in the human race, the usual arguments for the primacy of speech. Literate adult L2 users have been through the transformation that written language makes in their lives and they approach language quite differently from nonliterate adults and children (Goody, 2000). Their view of language for instance depends upon the main type of writing system they are familiar with in their L1, whether meaning-based like Chinese or sound-based like Italian. Transferring from one major system to another can have serious long-term disadvantages, say for Chinese learners of English (Haynes & Carr, 1990).

Speech before writing is then a shibboleth adopted from linguists, now sometimes challenged even within linguistics itself (Aronoff, 1992; Derwing, 1992). At one extreme many of the categories of spoken language used by linguists in the twentieth century are claimed to be artifacts subconsciously projected from linguists' first-acquired writing systems. The phoneme for example looks suspiciously like the invention of people with an alphabetic writing system rather than say the character-based kanji system of Japanese; the word the invention of people who use word spaces to separate words in writing, not found for example in Chinese. If modern linguistics had started in China, it might not have found the need for either the phoneme or the word.

Most SLA research has then been conducted on the spoken language, devaluing the writing system, probably just as important to most L2 users in the world today, who contact each other through e-mails, text messages, chat-rooms and web pages rather than spoken conversation. The sole reference to written language in *SoSLA* is in the context of illocutionary acts; *BaB* mentions the writing system briefly on seven pages, chiefly in connection with aphasia and brain functioning. Overall the effects of the primacy of speech assumption have been that SLA research has overemphasized the importance of the spoken language and has neglected the specific properties of the writing system.

Research specifically on L2 writing systems is starting to be carried out, as seen in Cook and Bassetti (2005). Much of it mirrors the early days of SLA research, overwhelmingly concerned with the transfer of the L1 writing system to the L2 writing system in a Contrastive Analysis mode (though mostly concerned with processing) and with assigning the errors of L2 learners to their L1 phonology and L1 writing system in an Error Analysis fashion. For instance, readers with meaning-based L1 writing systems are faster at word naming in Chinese as an L2 writing system than readers with sound-based L1 writing systems (Yang, 2000).

The Preeminence of the Monolingual Native Speaker

We have already alluded to the largely unspoken assumption that the subject matter of linguistics is the monolingual native speaker. This can be traced back at least to Bloomfield (1933, p. 43): "The first language a human being learns to speak is his *native language*; he is a *native speaker* of this language." The clearest statement of this linguist's point of view is perhaps Chomsky's River Charles metaphor in a famous interview with Francois Grosjean:

> Why do chemists study H_2O and not the stuff that you get out of the Charles River? You assume that anything as complicated as what is in the Charles River will only be understandable, if at all, on the basis of discovery of the fundamental principles that determine the nature of all matter, and those you have to learn about by studying pure cases.

(For the benefit of readers without a knowledge of U.S. geography, the Charles River flows through Boston). This can be called the *purity* argument for using monolinguals in linguistics: bilingual minds are in some sense impure, contaminated by the pollutants of another language. The true *pure* state of linguistic competence is a mind with one language. This applies to groups as well as to individuals: the language of a mixed community:

> Would not be *pure* in the relevant sense, because it would not represent a single set of choices among the options permitted by UG but rather would include *contradictory* choices for certain of these options. (Chomsky, 1986, p. 17)

While Chomsky's quotations relate primarily to the UG model, these do show the basic monolingual assumption in linguistics.

SLA research implicitly takes over this assumption: language is what native speakers know and do. Anything that does not conform to native speaker language is wrong. Judged by this criterion, there are indeed very few successful L2 learners, some might say none; Towell and Hawkins (1994, p.14) typically claim that "very few L2 learners appear to be fully successful in the way that native speakers are": well yes, if the only successful person by definition is the native speaker. As Sridhar and Sridhar (1980) point out, "Paradoxical as it may seem, Second Language Acquisition researchers seem to have neglected the fact that the goal of SLA is bilingualism."

Bilingualism researchers are more reluctant to subordinate their bilingual subjects to monolinguals than SLA researchers. Romaine (1994) insists that "it is clear that a reasonable account of bilingualism cannot be based on a theory which assumes monolingual competence as its frame of reference." The overall emphasis is an acceptance of the L2 user *as an L2 user* to be measured by the standards of L2 users. The L2 user is a genuine bilingual, not an imitation monolingual in the L2: bilingualism is not double monolingualism but a different state (Grosjean, 1989). The *ultimate attainment* of second language acquisition is not, and could never be, monolingual competence.

One retort to Chomsky's River Charles metaphor is that H_2O is not *pure* but a molecule built up from two hydrogen and one oxygen atoms; if we decompose it to its *pure* state, we would no longer be studying water as such but the properties of hydrogen and oxygen. The natural *molecul*e for human languages is the complex multicompetence state, not the pure monolingual one; monolinguals are missing an atom from the usual language molecule, so to speak. A Chomskyan argument called the *uniformity requirement* by Cook and Newson (2007) undermines the linguist's reliance on monolingual native speakers. This claims that a theory of language acquisition has to

apply to all children in all circumstances; language acquisition does not depend on the precise nature of the input language available, provided there is some input available. Our theory of language acquisition has then to accommodate what *all* children can potentially do. We know that children exposed to two languages acquire both of them, even if differently from monolinguals; children exposed to one language become monolinguals. The difference is then input-specific, a matter of the environment, and not part of a general theory of acquisition accounting for the potential for all human beings regardless of situation. Monolinguals do not acquire a second language because they are deprived of the necessary input, just as children deprived of L1 input do not acquire a first language (Curtiss, 1977); monolingualism is a particular case of an input-starved situation. Any human being has the potential to acquire more than one language. Indeed, even in terms of sheer numbers, there are probably more people in the world who use more than one language than those who use one.

Conclusion

Linguistics has then been both a source of inspiration and a curse to SLA research. Linguists' ideas about language are a major driving source, yet they can insidiously undermine it if their assumptions are not re-examined for appropriateness to the issues of L2 acquisition and use. However, if linguistics is ignored, SLA research often falls back on commonsense folk-linguistic views of language or ideas derived from the school grammar tradition. Perhaps any linguistics is better than none.

The relationship between SLA researchers and linguists has sometimes shown a lack of mutual understanding; linguists feel SLA research is misusing ideas long past their sell-by date; SLA researchers regret they are not getting usable tools and concepts from linguists and increasingly criticize the emphasis in linguistics on the monolingual native speaker. Hopefully this impasse will be resolved and SLA research will be better able to assert its independence from linguistics and to achieve its own goals of addressing the puzzle of one mind with two languages. While we have gone some way to answering most of our initial questions, the answers are far from complete.

List of Key Words and Concepts

Competence, Contrastive analysis, E-language, I-language, Input hypothesis, Interlanguage, Linguistics, Monolingual, Performance, Primacy of speech, Universal Grammar, Variation, VOT (Voice Onset Time)

Internet Sites Related to Linguistics and Bilingualism

American Association for Applied Linguistics: http://www.aaal.org/
British Association for Applied Linguistics: http://www.baal.org.uk/publs_journals.htm
Center for Applied Linguistics: http://www.cal.org/
National Clearinghouse for English Language Acquisition and Language Instruction Educational Programs: http://www.ncela.gwu.edu/
Second Language Research Forum: http://www.tc.columbia.edu/academic/tesol/SLRF2005/
Stephen's Krashen's Theory: http://www.sk.com.br/sk-krash.html

Discussion Questions

1. Do you think there is a single discipline that studies the acquisition and use of second languages or that there are really several disciplines (SLA research, bilingualism, psychology, etc.) that happen to use L2 evidence but have little in common?
2. Does or should linguistics have a monopoly on ideas about language itself?
3. Can any one view of language, linguistics, or language learning ever be completely right?
4. Do you agree that we should treat learners as people with independent language systems of their own, or as people with language systems that are deficient versions of the target, whether adults in L1 acquisition or native speakers in L2 acquisition?
5. To what extent do you think that the languages you know are indeed similar to each other or are different?
6. How important do you feel is the actual language input that L2 learners receive?
7. Is the use of hi-tech techniques of linguistic investigation such as Voice Onset Time (VOT) necessary to investigate L2 acquisition, or is there a place for such traditional techniques as grammaticality judgments?
8. Do you believe that particular areas of language such as syntax should form the core of SLA research or do you feel all areas are equally important?
9. Are the ideas of the primacy of speech and the preeminence of the native speaker valid for SLA research as well as for most mainstream linguistics?
10. What areas of linguistics do you feel could be most usefully exploited in SLA research without sacrificing its own research agenda?

Suggested Research Projects

1. Take a particular grammatical construction in two languages, say articles or questions that you know, and look up parallel grammatical descriptions in current grammar books. Could you really compare them? Do the differences correspond to the kinds of *mistakes* that learners actually make in your experience?
2. Suppose that you wanted to test a hypothesis about variation in L2 learning, say whether left-handed learners are better. Choose an appropriate area of linguistics to use and design a linguistically sound research method that shows whether there was an actual correlation.
3. Take a sample of recent articles from the SLA research literature—the SLABIB bibliography is available at http://homepage.ntlworld.com/vivian.c/SLA/SLABIB/index.htm—and see what use it makes of standard linguistic terms such as morpheme, phoneme, and word order. Does this demonstrate a closeness or a separation from linguistics?

References

Adamson, H., & Regan, V. (1991). The acquisition of community norms by Asian immigrants learning English as a second language: A preliminary study. *Studies in Second Language Acquisition, 13*(1), 1–22.

Anderson, J. R. (1983). *The architecture of cognition*. Massachusetts: Harvard University Press.

Archibald, J. (1993). *Language learnability and L2 phonology: The acquisition of metrical parameters.* Dordrecht: Kluwer.

Aronoff, M. (1992). Segmentalism in linguistics: The alphabetic basis of phonological theory. In P. Downing, S. D. Lima, & M. Noonan (Eds.), *The linguistics of literacy* (pp. 71–82) Amsterdam: John Benjamins.

Aronoff, M., & Rees-Miller, J. (2001). *The handbook of linguistics*. Oxford: Blackwell.

Bigelow, M., & Tarone, E. (2004). The role of literacy level in second language acquisition: Doesn't who we study determine what we know? *TESOL Quarterly*, *38*(4), 689–700.

Bloomfield, L. (1933). *Language.* New York: Holt.

Bresnan, J. (2001). *Lexical-functional syntax.* Oxford: Blackwell.

Brown, R. (1973). *A first language: The early stages*. London: Allen and Unwin.

Chomsky, N. (1957). *Syntactic structures.* The Hague: Mouton.

Chomsky, N. (1959). Review of B.F. Skinner Verbal Behavior. *Language*, *35,* 26–58.

Chomsky, N. (1965). *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.

Chomsky, N. (1986). *Knowledge of language: Its nature, origin and use*. New York: Praeger.

Chomsky, N. (1995). *The Minimalist Program*. Cambridge, MA: MIT Press.

Cook, V. J. (1985a). Chomsky's Universal Grammar and second language learning. *Applied Linguistics, 6,* 1–18.

Cook, V. J. (1985b). Language functions, social factors, and second language teaching. *IRAL*, *13*(3), 177–196.

Cook, V. J. (1993). *Linguistics and second language acquisition*. Basingstoke: Macmillan.

Cook, V. J. (1999). Going beyond the native speaker in language teaching. *TESOL Quarterly, 33*(2), 185–209.

Cook, V. J. (2002). Background to the L2 user. In V. J. Cook (Ed.), *Portraits of the L2 user* (pp. 1–28). Clevedon, Avon: Multilingual Matters.

Cook, V. J. (2004). *The English writing system*. London: Edward Arnold.

Cook, V. J., & Bassetti, B. (Ed.). (2005). *Second language writing systems*. London: Edward Arnold.

Cook, V. J., & Newson, M. (2007). *Chomsky's Universal Grammar: An introduction* (3rd ed.). Oxford: Blackwell.

Curtiss, S. (1977). *Genie: A psycholinguistic study of a modern-day "Wild Child."* New York: Academic Press.

de Saussure, F. (1959). *Cours de linguistique générale.* In C. Bally, A., Sechehaye, & A. Reidlinger (P. Paris, Trans.). *Course in general linguistics*. London: Peter Owen. (Original work published 1916).

Dechert, H. (1984). Second language production: Six hypotheses. In Dechert, H., Möhle, D., & M. Raupach. (Eds.), *Second language productions* (pp. 211–230). G. Narr.

Derwing, B. L. (1992). Orthographic aspects of linguistic competence. In Downing, P., Lima, S. D., & M. Noonan (Eds.), *The linguistics of literacy* (pp. 193–210). Amsterdam: Benjamins.

Dewaele, J.-M. (1994). Variation synchronique de taux d'exactitude. Analyse de fréquence des erreurs morpholexicales dans trois styles d'interlangue française. *International Review of Applied Linguistics, 32*, 275–300.

Dewaele, J.-M. (2004). Retention or omission of the "ne" in advanced French IL: The variable effect of extralinguistic factors. *Journal of Sociolinguistics, 8* (3), 433–450.

Dewaele, J.-M., & Regan, V. (2002). Maîtriser la norme sociolinguistique en interlangue française: Le cas de l'omission variable de "ne." *Journal of French Language Studies, 12*, 123–148.

Dulay, H., & Burt, M. (1973). Should we teach children syntax? *Language Learni*ng, *3,* 245–57.

Ellis, R. (1994). *The study of second language acquisition*. Oxford: OUP.

Ellis, R. (2003). *Task-based language learning and teaching*. Oxford: OUP.

Feyerabend, P. (1975). *Against method*. Atlantic Highlands: Humanities Press.

Flege, J. E. (1990). English vowel production by Dutch talkers: More evidence for the "similar" vs. "new" distinction. In J. Leather & A. James (Eds.), *New Sounds 90: Proceedings of the Amsterdam symposium on the acquisition of second-language speech* (pp. 255–293). Amsterdam: University of Amsterdam.

Goldschneider, J. M., & DeKeyser, R. M. (2001). Explaining the "natural order of L2 morpheme acquisition" in English: A meta-analysis of multiple determinants. *Language Learning, 51*(1), 1–50.

Goody, J. (2000). *The power of the written tradition*. Washington: Smithsonian Institute.
Gregg, K. R. (1995). Review of Cook, V. "Linguistics and second language acquisition." *Second Language Research, 11*(1), 90–94.
Grosjean, F. (1989). Neurolinguists, beware! The bilingual is not two monolinguals in one person. *Brain and Language, 36,* 3–15.
Haas, W. (1970). *Phonographic translation.* Manchester: Manchester University Press.
Halliday, M. A. K. (1985). *An introduction to functional grammar*. London: Edward Arnold.
Hamers, J., & Blanc, M. (2000). *Bilinguality and bilingualism* (2nd ed.). Cambridge: Cambridge Press.
Hannan, M. (2004). A study of the development of the English verbal morphemes in the grammar of 4–9 year old Bengali-speaking children in the London Borough of Tower Hamlets. Ph.D. Essex University.
Harris, R. (2000). *Rethinking writing*. Indiana: Indiana University Press.
Hawkins, R. (2001). *Second language syntax*. Oxford: Blackwell.
Hawkins, R., & Chan, C. (1997). The partial availability of Universal Grammar in second language acquisition: The "failed functional features hypothesis." *Second Language Research*, *13*(3), 187–226.
Haynes, M., & Carr, T. H. (1990). Writing system background and second language reading: A component skills analysis of English reading by native-speaking readers of Chinese. In T. H. Carr & B. A. Levy (Eds.), *Reading and its development: Component skills approaches* (pp. 375–421). San Diego, Academic Press.
Illitch, I., & Sanders, B. (1988). *ABC: Alphabetisation of the popular mind.* Berkeley: North Point Press.
Jakobson, R. (1953). Results of the conference of anthropologists and linguists. *IJAL Supplement, Memoir 8*, 19–22.
Kato, K. (2004). *Second language (L2) segmental speech learning: Perception and production of L2 English by Japanese native speakers.* Unpublished doctoral dissertation, University of Essex.
Kehoe, M., Lleo, C., & Rakow, M. (2004). Voice onset time in German/Spanish bilinguals. *Bilingualism: Language and Cognition*, *7*(1), 71–88.
Klein, W., & Perdue, C. (1997). The basic variety (or: couldn't natural languages be much simpler?). *Second Language Research 13*(4), 301–347.
Krashen, S. (1985). *The Input Hypothesis: Issues and implications.* New York: Longman.
Labov, W. (1966). *The social stratification of English in New York City*. Washington: Centre for Applied Linguistics.
Lado, R. (1957). *Linguistics across cultures.* Ann Arbor: University of Michigan Press.
Lado, R. (1964). *Language teaching: A scientific approach.* McGraw-Hill.
Lyons, J. (1968). *Introduction to theoretical linguistics*. Cambridge: CUP.
Major, R. C. (2001). *Foreign accent: The ontogeny and phylogeny of second language phonology.* Mahwah, NJ: Lawrence Erlbaum Associates.
McNeill, D. (1966). Developmental psycholinguistics. In F. Smith & G. A. Miller (Eds.), *The genesis of language: A psycholinguistic approach*. Cambridge, MA: MIT Press.
Meisel, J., Clahsen, H., & Pienemann, M. (1981). On determining developmental stages in natural second language acquisition. *Studies in Second Language Acquisition*, *3*(2), 109–135.
Mennen, I. (2004). Bi-directional interference in the intonation of Dutch speakers of Greek. *Journal of Phonetics*, *32,* 543–563.
Nathan, G. S. (1987). On second-language acquisition of voiced stops. *Journal of Phonetics, 15,* 313–322.
Nation, I. S. P. (2001). *Learning vocabulary in another language.* Cambridge: CUP.
Nenonen, S., Shestakova, A., Huotilainen, M., & Näätänan, R. (2005). Speech-sound duration processing in a second language is specific to phonetic categories. *Brain and Language, 92,* 26–32
Obler, L. (1982). The parsimonious bilingual. In L. Obler & L. Menn (Eds.), *Exceptional language and linguistics* (pp. 339–346). New York: Academic Press.
Pienemann, M. (1998). *Language processing and second-language development: Processability theory.* Amsterdam: John Benjamins.

Queen, R. M. (2001). Bilingual intonation patterns: Evidence of language change from Turkish-German bilingual children. *Language in Society, 30*, 55–80.

Rampton, B. (1996). Displacing the native speaker: Expertise, inheritance and affiliation. In T. Hedge & N. Whitney (Eds.), *Power, pedagogy and practice* (pp. 17–22). Oxford: OUP.

Regan, V. (1996). Variation in French interlanguage: A longitudinal study of sociolinguistic competence. In R. Bayley, & D. R. Preston (Eds.), *Second language acquisition and linguistic variation* (pp. 177–201). Amsterdam: John Benjamins.

Rehner, K., Mougeon, R., & Nadasdi, T. (2003). The learning of sociolinguistic variation by advanced FSL learners: The case of *Nous* versus *On* in Immersion French. *SSLA, 25,* 127–156.

Rizzi, L. (2004). On the study of the language faculty: Results, developments, and perspectives. *The Linguistics Review*, *21,* 323–344.

Romaine, S. (1994). *Bilingualism.* Oxford: Blackwell.

Sajavaara, K. (1981). Contrastive linguistics past and present and a communicative approach. In J. Fisiak (Ed.), *Contrastive linguistics and the language teacher* (pp. 33–56). Oxford: Pergamon.

Selinker, L. (1972). Interlanguage. *International review of applied linguistics, X*(3), 209–231.

Sridhar, S. N., & Sridhar, K. K. (1980). The syntax and psycholinguistics of bilingual code mixing. *Canadian Journal of Psychology, 34*(4), 407–416.

Stockwell, R., Bowen, J., & Martin, J. (1965). *The grammatical structures of English and Spanish.* Chicago: University of Chicago Press.

Tomasello, M. (Ed.). (1998). *The new psychology of language*. Mahwah, N.J: Lawrence Erlbaum Associates.

Towell, R., & Hawkins, R. (1994). *Approaches to second language acquisition*. Clevedon, Avon: Multilingual Matters.

Trudgill, P. (1974). *The social differentiation of English in Norwich.* Harmondworth: Penguin.

Tsimpli, T., Sorace, A., Heycock, C., & Filiaci, F. (2004). First language attrition and syntactic subjects: A study of Greek and Italian near native speakers of English. *International Journal of Bilingualism, 3*, 257–278.

Watson, I. (1991). Phonological processing in two languages. In Bialystok, E. (Ed.), *Language processes in bilingual children* (pp. 26–48). Cambridge: CUP.

Wei, Li. (1994). *Three generations, two languages, one family: Language choice and language shift in a Chinese community in Britain.* Clevedon, Avon: Multilingual Matters.

Wei, Longxing. (2000). Unequal election of morphemes in adult second language acquisition. *Applied Linguistics*, *21,* 106–140.

Weinreich, U. (1953). *Languages in contact.* The Hague: Mouton.

White, L. (1986). Implications of parametric variation for adult second language acquisition: An investigation of the pro-drop parameter. In Cook, V. J. (Ed.), *Experimental approaches to second language acquisition*. Oxford: Pergamon.

White, L. (2003). *Second language acquisition and Universal Grammar*. Cambridge: CUP.

Williams, L. (1977). The perception of consonant voicing by Spanish English bilinguals. *Perception and Psychophysics, 21*(4), 289–297.

Yang, J. (2000). Orthographic effect on word recognition by learners of Chinese as a foreign language. *Journal of the Chinese Language Teachers Association, 35*(2), 1–18.

Yuan, B. P. (1997). Asymmetry of null subjects and null objects in Chinese speakers' L2 English. *Studies in Second Language Acquisition, 19,* 467–497.

Zampini, M. L., & Green, K. P. (2001). The voicing contrast in English and Spanish: The relationship between perception and production. In J. Nicol (Ed.). *One mind, two languages* (pp. 23–48) Oxford: Blackwell.

Chapter 12

Second Language Acquisition and Bilingualism

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The following anecdotes reveal how even after many years of experience with another language, there are still areas that make nonnative speakers (NNS) of a language different from native speakers (NS) of that language.

1. One morning, Mrs. G, a native speaker of English now living in Israel, was doing her daily shopping at the local supermarket. As she was pushing her shopping cart she unintentionally bumped into Mr. Y, a native Israeli. Her natural reaction was to say *I'm sorry* (in Hebrew). Mr. Y turned to her and said, *Lady, you could at least apologize*.
   On another occasion the very same Mr. Y arrived late for a meeting conducted by Mr. W (a native speaker of English) in English. As he walked into the room he said, *The bus was late,* and sat down. Mr. W, obviously annoyed, muttered to himself, *These Israelis, why don't they ever apologize!* (Olshtain & Cohen, 1989, p. 53).
2. From Goldschmidt (1996, p. 255)
   NNS: I have a favor to ask you.
   NS: Sure, what can I do for you?
   NNS: You need to write a recommendation for me.
3. A Chilean jockey, after winning the Kentucky Derby, was accused of carrying something in his hand other than his whip. Apparently, he had told a reporter that he wore a Q-Ray, which is a therapeutic bracelet used for arthritic conditions. What had been understood was a *cue-ring*, which apparently the reporter had never heard of (probably because it doesn't exist).

While these nonnative speakers are able to speak a second language with grammatical accuracy, they have not learned to use language appropriately, or in the case of example 3, to pronounce language well. Further, with regard to example 3, despite the fact that the reporter did not know what a *cue-ring* was, he assumed it to be something illegal. Had the reporter minimally recognized that perception of nonnative speech often occurs through the filter of our native language sound system, and that that perception is not always accurate, the problem might have been avoided. That, coupled with the fact that he had never heard of a *Q-ring*, might have suggested the need to seek greater clarification and the two- to three-day scandal that resulted could have been avoided.

The study of second language acquisition is concerned with what language learners know and don't know and how they come to know it, and also deals with communication difficulties such as the ones exemplified previously.

Introduction: Definition of Terms

The second/foreign language literature and the bilingualism literature often deal with the same or similar phenomena, but with different terminology. Because this chapter appears in a book devoted primarily to the field of bilingualism, and because this chapter draws on literature from a different (albeit related) field, second language acquisition, it is particularly important to attempt to sort out some of the terminological differences. In the first part of this article, we deal with some of the varying definitions common in the discourse of these two fields, providing the conventional use of the words and terms in the second language acquisition (SLA) literature. It is hoped that this section will contribute to the unpackaging, and hence understanding, of some of the terms used in both fields. We use the term *second language acquisition* quite broadly in this chapter. It includes the study of the acquisition of any language learned after the first language. The term, unfortunately, is vague as to whether the language being learned is actually the second, third, fourth, et cetera language. *Second language acquisition*, in a strict sense, refers to language learning in the environment where the language being learned is spoken, whereas foreign language learning refers to learning in an environment where the native language, not the target language is spoken; however, the term second language acquisition is used as a general cover term, frequently referring to languages learned in either a second or foreign language environment. Thus, the conventional use of the term second language acquisition is quite broad, referring to any language learned after the first in either a second or foreign language environment. This is not to say that SLA researchers do not recognize important differences in the environment or in the chronological ordering of learning, as these factors are important considerations in SLA studies (see Gass, in press for a discussion of the relevance of the environment in learning, and Cenoz and Jessner (2000) for articles on the acquisition of languages beyond the second); however, a detailed discussion of these issues is beyond the scope of this chapter.

Native Speaker

The term *native speaker* seems, at first glance, quite an easy term to understand and, for some, it is a quite clear and uncontroversial term. A native speaker is a person who, having learned the language in question from birth, has fully acquired and has full competence in that language. For example, a monolingual speaker who learns only one language from birth, is probably uncontroversially a native speaker of his/her one (and only) language.

However, Davies (1991, 2003a–b) points out that even this seemingly clear concept is not without different interpretations and ambiguities. This is particularly the case when speakers acquire a given language from a very young age and the distinction between *native* and *near-native* speaker is ambiguous. Davies (2003b, p. 435) provides six ways in which the term native speaker can be characterized.

A native speaker:

1. Acquires the first language (L1) … in childhood.
2. Has intuitions … about his/her idiolectal (individual) grammar.
3. Has intuitions about those features of the Standard Language grammar that are distinct from his/her idolectal grammar.
4. Has a unique capacity to produce fluent spontaneous discourse … In both production and comprehension the native speaker exhibits a wide range of communicative competence.
5. Has a unique capacity to write creatively …
6. Has a unique capacity to interpret and translate into the L1 … Disagreements about the deployment of an individual's capacity are likely to stem from a dispute about the Standard … Language.

Different definitions each draw, to varying degrees, on different combinations of some of the factors listed herein. As mentioned earlier, the concept is not without controversy. For example, issues of identity figure into who is a native speaker of what. That is, individuals may begin life as native speakers of one language and then at a certain point in life find themselves in a different environment where use of the native language is severely limited. The question arises in a situation such as this as to what the native language is and even what a native speaker is. In instances such as these, it may be more important to consider an individual's *most comfortable* language.

Near-Native Speaker

Closely related to the concept of native speaker is the near-native speaker. Most individuals know or have heard someone who speaks a second language as well as a native speaker (perhaps with the exception of pronunciation). An example of this is the diplomat Henry Kissinger (born in Germany) who came to the United States at about age 15. In many measures of his language ability, he would meet anyone's criterion of a native speaker of English. The use of the term near-native speaker comes primarily from the literature on ultimate attainment. The main question is the extent to which an adult learner can structure and organize his/her second language in the way a native speaker does. In other words can "Nonprimary language acquisition … be *complete?*" (Sorace, 1993, p. 22). But, the definition of near-native speaker is operational and not absolute. For example, White and Genesee (1996) described near-native speakers as "Virtually indistinguishable from native speakers" (p. 242) and identified a group of near-native speakers on the basis of evaluations by native speakers on the following categories: pronunciation, morphology, syntax, vocabulary choice, fluency, and "overall impression of nativeness" (p. 242). Sorace (1993) determined near-nativeness through individual interviews with the criterion used for the determination being "Native-like performance from the point of view of fluency and accuracy" (although phonological accuracy was not taken into account; p. 35). As Sorace acknowledges, this is clearly impressionistic, although she did ensure some degree of validity by making sure that the individuals could perform at a high level for a minimum of 10 minutes.

In general, we have two different ways of thinking of the concepts of native and near-native—the practical and the technical. In practical terms, native speakers are those who, in everyday conversation, are indistinguishable from other native speakers, and near-native speakers are highly proficient speakers who are distinguishable from native speakers, but only in only small ways. The technical definition refers to a native speaker as someone who is indistinguishable in a scientific sense (through comparative performance on tests designed specifically to measure the outer reaches of proficiency) from other native speakers—a near-native speaker is an individual who in casual conversation may be indistinguishable from native speakers but who may differ in subtle ways from native speakers, as the examples at the beginning of this chapter show. While these fine distinctions between native and near-native are, practically speaking, unimportant given that most near-native speakers are indistinguishable, or nearly so, from native speakers, the difference is nonetheless important in a linguistic sense (cf. Thomas, 2006, for a review of L2 proficiency).

Advanced Language Learner

Another term that appears in the literature with numerous uses is *advanced language learner*. This term is particularly vague and refers to a wide range of abilities. In fact, this term (and similar ones such as *beginner* and *intermediate learner*) is notoriously problematic in the second language literature and in the psycholinguistics of bilingualism in that it is difficult to compare research results from one study to another because one researcher's intermediate-level learner may be another's advanced learner. In many cases, what is meant by advanced language learner is what others call near-native, the difference being the theoretical tradition within which they are operating. Bardovi-Harlig (2004) reviews the literature on the advanced language learner with particular relation to the acquisition of pragmatics in a second/foreign language, noting the following different ways in which researchers have identified advanced language learners (pp. 9–10):

1. Other-identification—researchers use others (e.g., friends, colleagues, teachers of potential participants) for purposes of classification
2. Other-identification in combination with tests of language proficiency
3. Evaluation by trained judges
4. Length of residence (controlling for age of arrival)
5. Length of residence (not-controlling for age of arrival)
6. Years of study in language program
7. Use of language in occupational contexts
8. Test scores in a language program
9. Comparison with native speakers
10. Scores on standardized tests.

In reviewing 46 studies that focused on the advanced language learner (in the context of pragmatics), Bardovi-Harlig (2004) finds a wide range of definitions. Some of these are provided below:

1. Length of residence about 2 years
2. International faculty using English for communication
3. Mean TOEFL (Test of English as a foreign language) score of 593
4. TOEFL scores greater than 525
5. Elite of the country, studying to be English teachers
6. Graduate students in a university in the United States.
7. Length of stay 5–7 years

8. Length of residence about 2 years
9. University enrollment upper division literature and linguistics courses
10. Greater than 6 semesters classroom instruction plus exposure to target language environment
11. Program placement test
12. Sufficiently proficient to successfully pass regular academic classes in a U.S. university.

These are but a few of the examples of how advanced learner is defined. They range from vague to contradictory, or, minimally, are noncompatible (e.g., length of stay 5–7 years vs. length of residence about 2 years). Thus, in any specific reading of the literature, one has to determine carefully the relevance of the definition to one's own research interests and concerns (see also Bartning, 1997; Kasper & Rose, 2002).

Heritage Language Speaker

Heritage language speakers are, broadly speaking, those who have been exposed to a language of personal connection (Fishman, 2001). This generally refers to immigrant or indigenous languages or, in some contexts, to colonial languages. Valdés (2001) notes that "it is the historical and personal connection to the language that is salient and not the actual proficiency of individual speakers. Armenian, for example, would be considered a heritage language for American students of Armenian ancestry even if the students were English-speaking monolinguals" (p. 38).

The term heritage language speaker has only recently become prevalent, having its origins in the education literature. Until 1996, according to Valdés (2001), heritage speakers of Spanish had been primarily equated with native speakers of Spanish. More recently, this group of speakers has been of interest to second language researchers. However, the interests of these two research groups (educators and second language researchers) are quite different, with the former asking questions of language maintenance and even language revitalization and the latter asking questions relating to what early/home exposure means for language learning.

For second or foreign language research, the important issue is the exposure and use of the language in childhood. And here, as can be easily imagined, there are numerous problems since exposure and use can vary from individual to individual. Unlike much of the literature on heritage language learners, which considers the language of the ancestral family with or without exposure and use, Polinsky (in press) defines heritage language as the language "Which was first for an individual with respect to the order of acquisition but has not been completely acquired because of the switch to another dominant language. An individual may use the heritage language under certain conditions and understand it, but his/her primary language is a different one" (p. 1).

The recognition of heritage language learners as a variable in second language research is recent. Often, the concept of heritage language speaker is (often unknowingly) ignored, and these individuals are consequently included in the database of studies (as either native speakers or L2 learners). Sorace (1993) is an exception in that she explicitly controlled for heritage language speakers in her study on the acquisition of Italian by eliminating them from her database, stating that "none had Italian origins" (p. 35). In recent years, specific studies have been devoted to an understanding of what language knowledge heritage speakers have (e.g., Polinksy, in press; Montrul, 2004; Gass & Lewis, 2007).

Second Language Learner

In the second language literature, second language learners are the object of study. As noted earlier, this term encompasses a wide range of abilities (beginner, intermediate, advanced) and a wide range of means of getting to the particular point of linguistic knowledge (e.g., exposure, study). The details of these learners are specified in most research reports by providing information such as amount of time studying the language, amount of exposure to the language, and test scores. However, the main point is that these individuals are *learners* and the emphasis is on the *processes* involved in learning and the knowledge they have of the L2.

Second Language Speaker

The term *second language speaker* refers to a person who speaks a language other than the native language. The term second language speaker can refer to a person who speaks a second, third, forth, etc. language. The term *second* simply means any language other than the first and focuses on the chronological order of learning. This term therefore designates someone who learned a second language after having learned the first, but does not necessarily entail that the person is still a learner. The example given previously of Henry Kissinger is a case in point. While he is no longer learning his English (at least not any more than an adult native speaker is still learning his/her native language), he is, nonetheless, a second language speaker of English. His language learning history might be the object of theoretical inquiry. The question is what the final stage of learning can look like in "[n]on-primary language acquisition, that is, whether such a state is quantitatively and/or qualitatively different from the monolingual steady state" (Sorace, 2003, p. 130).

Bilingual

The concept of *bilingualism* is interpreted differently in the field of SLA and fields such as psychology and education. That is, second language researchers reserve use of the term for those who are shown to be the equivalent of native speakers of two languages, as assessed through a given linguistic measure. Thus, from the perspective of second language researchers, *bilingual* is a difficult term. In its strict meaning, it refers to someone whose language is in a steady state, who has learned and now knows two languages. That is, bilingual refers to an end point: someone is bilingual. Within a second language research context, this interpretation of the term is generally not a focus of inquiry. Rather, second language researchers, because of their interest in discovering the second language acquisition process, focus on all stages of acquisition up to and including near-native speakers or advanced language learners.

The use of the term, as just described, does not generally appear to be the case in some of the psychological and educational literature on bilingualism. For example, Edwards (2004) starts off his article on the foundations of bilingualism by saying, "Everyone is bilingual. That is, there is no one in the world (no adult, anyway) who does not know at least a few words in languages other than the maternal variety. If, as an English speaker, you can say *c'est la vie* or *gracias* or *guten Tag* or *tovarisch*—or even if you only understand them—you clearly have some *command* of a foreign tongue … The question, of course, is one of degree …" (p. 7). He goes on to say, "It is easy to find definitions of bilingualism that reflect widely divergent responses to the question of *degree*" (p. 8). Bhatia (2004) states this in an interesting way when he refers to "The process of second language

acquisition—of becoming a bilingual" (p. 5). In other words, the end result of second language acquisition is a bilingual speaker. Given that bilingualism is seen as the end result, and given that we know that native-like competence in a second language is rare, there is some difficulty in discussing bilingualism in this way. Thus, Bhatia and Edwards refer to two different phenomena. Edwards says that one is bilingual at any point in the second language learning process, whereas Bhatia refers only to the end point and does not deal with whether or not that end point has to be *native* or not. In other words, the issue seems to be a matter of degree (whether or not one is bilingual even if not a native speaker of the L2), and of end point (whether or not one is bilingual if still in the process of acquisition). Second language researchers are more likely to reserve use of the term for the end state.

Valdés (2001) also discusses the issue of degree when she says, "The term *bilingual* implies not only the ability to use two languages to some degree in everyday life, but also the skilled superior use of both languages at the level of the educated native speakers" (p. 40). She acknowledges that this is a narrow definition for it considers the bilingual as someone who can "Do everything perfectly in two languages and who can pass undetected among monolingual speakers of each of these two languages" (p. 40). This she refers to as the *mythical bilingual*. She argues that there are, in fact, different types of bilinguals and that it is, therefore, more appropriate to think of bilingualism as a continuum with different amounts of knowledge of the L1 and L2 being represented. In this view, talking about bilinguals can refer to the process of learning as well as the end result, the product of learning.

Some researchers make a distinction between second language learners and bilinguals, as is clear from the title of an article by Kroll and Sunderman (2003): "Cognitive processes in second language learners and bilinguals." In this article, the authors refer to *skilled adult bilinguals*, presumably the rough equivalent of *advanced language learner*.

Finally, Deucher, and Quay (2000) define bilingual acquisition as, "The acquisition of two languages in childhood" (p. 1), although they point to the difficulties involved in this definition given the many situations that can be in place. They point to De Houwer (1995) who talks about *bilingual first language acquisition*, referring to situations when there is regular exposure to two languages within the first month of birth and *bilingual second language acquisition*, referring to situations where exposure begins later than one month after birth but before the age of two.

Multilingual

Often the term bilingual is used loosely to incorporate multilingualism, as is clear from the introduction to a section of a book by Bhatia and Ritchie (2004). Bhatia states that "the investigation of bilingualism is a broad and complex field, including the study of the nature of the individual bilingual's knowledge and use of two (*or more*) languages (emphasis ours)" (p. 5). Cenoz in her review (in press) of this book states "The editors make a remark in the introduction about the use of the word *bilingualism* in the title of the book and say that they do not exclude additional languages and that the chapters in the book include the *full range of multilingualism*. However, it is clear that the use of the term *bilingualism* is problematic because the Latin prefix *bi* means *two* …"

Conclusion

There are many grey areas that present a problem for second language researchers. As can be seen from this brief discussion, the terminology used in various literatures is vague, at times

contradictory, and often limited to a narrow domain. It is frequently the case that two groups of researchers refer to the same phenomenon by different names (e.g., *advanced language learners* in the second language literature versus *bilinguals* in the bilingual literature or *heritage language learners* by those who are concerned with language maintenance versus *second language learners* by those concerned with learning). It is thus crucial to understand exactly how various terms are used as one meanders through research reports.

Creating a Language System

Perhaps the most fundamental concept in studying how people learn a second language is the notion of a linguistic system. Just as language is systematic and children create a linguistic system as they learn their first language, second language learners also create a system that is largely unconscious. A learner's developing linguistic system is most commonly known as an *interlanguage*.

The Nature of the Developing System

There are a few features of interlanguages that we point out: (a) they are dynamic, (b) they are systematic, (c) there are stages of development, (d) the system may include prefabricated (chunked) patterns, and (e) learners often appear to be regressing.

Dynamic

Unlike someone's native language, which, at least by adulthood, is relatively stable (possibly with the exception of vocabulary), interlanguages are in a state of flux as learners learn new forms and attempt to integrate them within their current system. As new information enters the system, the old system is modified.

Systematic

Despite the fact that interlanguages often do not have the same degree of sophistication as a fully-formed language, they are nonetheless systematic. Consider the sentences in (1) that follow. These come from an Arabic speaker in the early stages of learning English. The intended meaning (gleaned from context) is provided in parentheses in e–g.

1. Data from Hanania (1974)
   a). He's sleeping
   b). She's sleeping
   c). It's raining
   d). He's eating
   e). Hani watch TV (is watching)
   f). Read the paper (He is reading the paper)
   g). Drink the coffee (He is drinking the coffee)

Although at first glance, this learner appears to use the verb *to be*, in this case, the third singular *is* at some times and not at others, a closer examination suggests an underlying *system*. In

sentences 1a–d, the learner uses a contraction followed by the progressive form of the verb when there is no direct object. On the other hand, when there is a direct object (as in sentences 1e–g), the simple form of the verb is used (with or without the subject) and the copula *is* is missing. An explanation of this distinction goes beyond the scope of this chapter although we might speculate that it may have to do with processing limitations. The important point is that what at first glance may appear random, on closer examination reveals regularity.

Stages of Development

In many areas of acquisition, there are predictable stages of acquisition. Table 12.1 from Mackey (1995) shows the development of English question formation. What is interesting is that this acquisition order holds for learners of all native languages, regardless of their first language, and is relatively impervious to instruction (although see Mackey, 1999, for evidence of learners being able to move through stages at different rates).

Prefabricated Patterns

Very often, in learning a second language, a learner may hear what sounds like one word, but which may actually be a *blend* of more than one word. These are called *prefabricated patterns* or *chunks*. As an example, Hakuta (1974) presents interesting data, given in (2) from Uguisu, a child Japanese speaker learning English. In Uguisu's first month in the United States, she says the following:

2. Data from Hakuta (1974)
   a). Do you know?
   b). How do you do it?
   c). Do you have coffee?
   d). Do you want this one?

These appear to be well-formed English questions. However, upon considering her English a month later, we note the following (intended meaning in parentheses):

   e). What do you doing, this boy? (What is this boy doing?)
   f). What do you do it, this, froggie? (What is this froggie doing)
   g). What do you doing? (What are you doing?)
   h). What do you drinking, her? (What is she drinking?)

How can we account for the fact that at one point she can form complex English questions with *do,* but a month later, she can no longer do so? The most plausible explanation is that she does not analyze *do you* as a complex question form, but rather has heard it when someone is clearly asking her a question. She has consequently learned it as a chunk, that is, as a single word or unit. This learner only appears to have acquired English questions in month 1; once the questions become more complex with the introduction of *what* in her lexicon, we are able to see that *do you* was probably not made up of two words at all (in month 1 or month 2), but only serves to indicate a question. This is a prefabricated pattern and it is only with time that this *chunk* will become *unpackaged* into its component parts of *do* and *you*. This would become obvious, for example, when researchers start to observe her using *does* appropriately.

Table 12.1 Developmental Stages of English Question Formation (adapted from Mackey, 1995, and reprinted by permission of author)

Developmental Stage	*Example*
Stage 1: Single Units	
Single words Single units	What? What is your name? [This is often an unanalyzed chunk of speech whereby a learner thinks of this as a single/unit or word, as if it were "whatisyourname?"]
Stage 2: Subject Verb Object (SVO)	
Basic word order with intonations	It's a monster? Your cat is black? You question have a cat? I draw a house here?
Stage 3: Fronting (*wh*- word/*do*)	
Direct questions with main form of fronting	Where the cats are? What the cat doing verbs and some in your picture? Do you have an animal? Does in this picture there is a cat?
Stage 4: Pseudo inversion: yes/no questions, verb *to be*	
In yes/no questions an auxiliary or modal (e.g., *can/could*) is in sentence-initial position. In *wh*- questions the verb *to be* and the subject change positions.	Have you got a dog? Have you drawn the cat? Where is the cat in your picture?
Stage 5: *Do*/auxiliary second	
Q-word → auxiliary/modal → subject (main verb, etc.)	Why (Q-word) have (auxiliary) you (subject) left home?
Auxiliary verbs and modals are placed in second position after *wh*- question words and before subjects (applies only in main clauses/direct questions).	What do you have? Where does your cat sit? What have you got in your picture?
Stage 6: *Can* inversion, negative question, tag question	
Can inversion: *wh*- question inversions are not present in embedded clauses.	Can you see what the time is? Can you tell me where the cat is?
Negative question: A negated form of *do*/auxiliary is placed before the subject.	Doesn't you cat look black? Haven't you seen a dog?
Tag question: An auxiliary verb and a pronoun are attached to the end of a main clause.	It's on the wall, isn't' it?

U-Shaped Learning

The example above appears, on the surface, to show that this learner has regressed. *U-shaped learning* refers to the phenomenon whereby learners seem to have *unlearned* what they apparently knew at an earlier time. When one investigates further, however, it becomes clear that what seemed to be correct was only correct by accident and not because any target-like system had been learned, as we saw with the previous *do you* example. Thus, *chunked learning*, that is, the learning as a single undifferentiated unit of what a native speaker might consider two or even three words, becomes a way for a learner to use language before she or he is fully able to *unpack* the unit into appropriate component parts. This may have the consequence of appearing to be regression.

The Starting Point

As learners set about the task of acquiring a language, it is important to consider what knowledge or information they bring to the task. What expectations or assumptions do learners have at the start of the acquisition process? With regard to children learning their first language, a predominant view is that children have an innate capacity to acquire human language (Chomsky, 1981). Chomsky and other nativist linguists argue that children are born with an innate capacity to learn their native language. Just as all children, barring any physical impairment, eventually learn to walk, all human children, barring any language impairment or other unusual circumstances, become proficient speakers of their native language. Additionally, all child language learners, regardless of the language they are acquiring, follow roughly similar timetables and acquisition stages. Thus, a child in Kenya learning Swahili will begin babbling, utter her first word, and begin making two-word sentences at roughly the same age as a child in China learning Chinese. Furthermore, linguists have suggested that the only logical explanation for how young children come to learn all the complex rules of their native language, given the limited language samples that they are exposed to, is that children have a biological capacity for language acquisition as well as innate assumptions and expectations about the language they are learning.

This biologically endowed capacity to acquire one's native language includes the child's inherent expectations and assumptions about how human languages work. These expectations, or linguistic *principles*, provide limits or constraints on how human languages can be constructed, thereby ruling out certain linguistic impossibilities. This collection of linguistic principles, which are claimed to be universal, and the learner's inherent knowledge about how exactly these principles can be realized in human languages, form part of what is referred to as *Universal Grammar* (UG). UG helps make the task of developing a complex linguistic system much easier for the child. Another component of UG are parameters which can vary from language to language (e.g., some languages, such as English, have mandatory pronouns—*I speak English*—whereas other languages, such as Spanish, have optional discourse-based constraints on pronoun use—*hablo español*). A child must be exposed to the language in order to determine exactly how each parameter is realized in the given language.

Excluding children with specific impairments, UG enables children to fully acquire their native language. Adult L2 learners, however, exhibit much greater variability in their ability to fully acquire another language, and their achievement of native-like competence in a second language is, according to many researchers, quite rare, if not impossible, a point taken up later in greater detail. Thus, the question of what role, if any, UG plays in the second language acquisition process is a topic of much interest and research (see White, 2003 for thorough coverage on this topic).

Second language researchers have taken positions on all sides of this issue. One position is that UG is available to second language learners in the same way that it is available to the child first language learner. That is, second language learners begin the acquisition task with the assumptions and expectations about the new language that are available, through Universal Grammar, to children (Epstein, Flynn, & Martohardjono, 1996).

While it is not unreasonable to suggest that adult language learners are still able to access UG in order to help with the acquisition process, second language learner behavior indicates that the language acquisition process may be different for adult second language learners than it is for a child learning his or her native language due, in part, to the fact that the second language learner has already acquired a first language. Data from second language learners indicate that the rules and conventions of the first language play a potentially important role in various stages of the acquisition process in that rules and conventions from the first language are often used to the context of the new language, a point discussed in detail in a later section.

Rather than beginning the second language acquisition task simply with UG, some researchers have suggested that second language learners begin the acquisition task by equating the new (L2) grammar with the grammar of their first language (L1), and then rely on UG principles and parameters to guide the subsequent learning process. Proponents of variations of this position argue that the second language learner uses most or all of the L1 grammar to the L2 context and assumes that the L2 grammar is the same as the L1 grammar until the learner notices properties of the L2 that are inconsistent with the L1, at which time the learner is able to rely on the constraints provided by UG in order to restructure the developing grammar so that it conforms to the L2 (see Eubank, 1994, 1996; Schwartz & Sprouse, 1996; Vainikka & Young-Scholten, 1996; and for variations of these *full access* models). In this way, the learner is able to access the principles and parameters that UG provides, with the L1 grammar functioning as the initial state. While this view acknowledges the important role that the L1 grammar plays for the second language learner, there is still much discussion and controversy surrounding this and questions of the starting point for learning.

In addition to models arguing that second language learners are able to make full use of the principles and parameters of UG, there are those who argue that adult second language learners must rely exclusively on general learning mechanisms to acquire the language and do not make use of the constraints provided by UG at all. For example, in the processability approach of Pienemann (1989, 1998), the underlying notion is that there is a predictable acquisition order. Rather than simply providing a statement of acquisition order, the processability approach attempts to provide an explanation for that order based on processing difficulties and limitations. In sum, there are numerous theoretical approaches to the study of second language acquisition that emphasize the linguistic system that learners start with and the means available to them as they attempt to learn a second language.

The Role of the L1

In addition to the potential role of UG in the second language acquisition process, the learner's first language (L1) also plays a potentially significant role. In the 1950s and 1960s, the L1 was seen to be of major importance to the second language acquisition process. At that time, in the behaviorist tradition, language learning was viewed as a process of habit formation. According to this view of language learning, learners automatically relied on rules of the L1 and applied them to the L2 context. Language learning, then, involved eliminating the inappropriate L1 rules/forms while maintaining the appropriate L1 forms. Proficient speakers of the L2 with whom the learner

interacted, such as a language teacher, facilitated acquisition by providing positive modeling and reinforcement of *good language habits* as well as negative reinforcement, such as error correction, for the learner. In this sense, the role of the L1 was viewed to be a potential source for both facilitation and interference. For features of the L2 similar to those of the L1, *positive transfer* of the L1 feature was predicted to occur and the learner would acquire that feature of the L2 without difficulty. In areas where the features of the L2 differed from those of the L1, the L1 rule was predicted to cause *interference* and the learner would need to eliminate the *bad habit* of the L1 rule.

As views of the language learning process developed and changed, and more researchers focused attention on the role of the L1 in the second language acquisition process, the straightforward *same = easy* and *different = hard* explanation for L1 influence was challenged. L1 influences were viewed to be much more complex and were found to affect the language acquisition process in a more complex way, operating in conjunction with other factors such as perceptions of distance between of the L1 and the L2 (Gass, 1996; Odlin 2003).

Given that the L1 is only one of a number of factors that affect the course and pace of language acquisition, it is important to consider what specific features of a learner's L1 are most likely to be candidates for use in the L2 context. Researchers make the case that all areas of language—grammar, pronunciation, rules of language use, word formation, and even writing—have features that learners apply to the L2 context (see Gass, 1996; Gass & Selinker, 1992; Odlin, 1989, 2003 for an overview). Though language learners transfer components from all areas of language and apply them to the L2 context, learners are more likely to transfer some features of language than others.

Kellerman (1977, 1978, & 1979) was one of the first to challenge the behaviorist view of language transfer and argued that transfer is not an automatic process. The individual learner's judgments about similarities and differences between the L2 and the L1 are key to determining which language features are transferable to the L2 and which are not. In some cases when learners perceive a similarity between the L2 and the L1, transfer is more likely than when they perceive a great difference.

In addition to perceived similarity, researchers have suggested that learners also judge the transferability of different language features based on such concepts as transparency. Thus, a phrase that the learner perceives to have a straightforward or transparent meaning is intuitively more "transferable" than a phrase that the learner perceives to be more idiosyncratic in meaning. For example, a phrase such as *make a difference* is more likely to be transferred to an L2 than *kick the bucket*, given the greater transparency of meaning of the first in comparison to the second.

One way in which transfer can have an effect on the acquisition process relates to the interaction of transfer and learner progress through second language developmental stages of acquisition. For example, Henkes (1974) conducted a longitudinal investigation of the acquisition of English of three children, native speakers of French, Spanish, and Arabic. One area of concern was the copula (the verb *to be*), which is present in French and Spanish, but not in Arabic. A common developmental pattern is the omission in English of the copula *is* in equational sentences. In (3) below are examples from the native languages of the three children in question.

3). Examples of equational sentences from French, Spanish, and Arabic

French	sa maison est vieille
	his house is old
Spanish	su casa es vieja
	his house is old
Arabic	baytuhu qadimun
	house his old

None of the three children used the copula in English consistently, so one could argue that this was a developmental issue rather than a transfer issue. However, Zobl (1982) pointed out that there was a definite, but more subtle influence of the native language in the form of learning rates. The French and Spanish children regularly used the copula after the early stages of learning, whereas the Arabic child (possibly finding a counterpart in the native language) continued variable usage for a much longer period of time.

Current thinking about the role of the L1 in the second language process has evolved since the early behaviorist views of L1 transfer. L1 influence is viewed as a complex process affected by factors such as perceived similarity and distance between L2 and L1 features as well as the transparency of a given feature (cf. Ringbom, 2007). Furthermore, the L1 can interact with the developmental stages of acquisition through which all second language learners progress, in that learners may remain longer in a particular developmental stage if that stage is similar to the L1 rule.

End Point

As discussed earlier, many researchers support the position that children have a biologically driven capacity for acquiring language. All human children, born into an environment where they are provided the opportunity to interact in the language, eventually become fully proficient in that language. It is only in rare and unusual circumstances, such as when a child has a severe brain impairment or injury or is somehow deprived of basic exposure to language, that complete acquisition of language fails to take place.

This picture changes dramatically as children mature and set out to learn a language as teenagers or adults. Adult language learners are much less likely to successfully acquire a language to the degree that they are indistinguishable from native speakers. In fact, some researchers have suggested that it is impossible to be completely successful at language learning when one begins this task later in life (for a review of research on the age and its potential effect on SLA, see Birdsong, 1999; Hyltenstam & Abrahamsson, 2003; Moyer, 2004; Singleton & Lengyel, 1995; Singleton & Ryan, 2004).

Because language acquisition is essentially universally successful among normal first language learners and significantly less so among adults, researchers have suggested that there exists a critical or sensitive period in the maturation process during which humans are able to acquire language, and after which the "window of opportunity" closes so that adults are no longer able to be completely successful at acquiring language. This is often referred to as the critical period hypothesis (see Lenneberg, 1967).

Cases of children who were deprived of language stimulation during childhood show that when first language acquisition begins later in life, after the critical period for language acquisition, language learners are unable to fully acquire language.

One dramatic case is the case of *Genie*. At the age of 2½, Genie was confined to a room where she received essentially no verbal interaction until the day that she was rescued at the age of 13 years and 7 months of age. In addition to the psychological trauma that she suffered, Genie was also deprived of the opportunity to learn language until after the critical period for language learning. Because of this, Genie's language was severely impaired and remained so despite extensive attempts to teach her language. Akmajian, Demers, Farmer, & Harnish (1995, p. 478) presented the following sample of Genie's speech, recorded by Susan Curtiss, the linguist who worked with Genie to study her language development:

> Genie could not memorize a well-formed WH-question. She would respond to "What do you say?" demands with ungrammatical, bizarre phrases that included WH question words, but she was unable to come up with a phrase she had been trained to say. For example, instead of saying the requested "Where are the graham crackers?" she would say "I where is graham cracker," or "I where is graham cracker on top shelf." In addition, under pressure to use WH-question words, she came out with sentences such as:
>
> Where is tomorrow Mrs. L.?
> Where is stop spitting?
> Where is May I have ten pennies?
> When is stop spitting? Curtiss (1977, p. 31)

As this language sample clearly shows, Genie's linguistic development was severely impaired due to the linguistic isolation she experienced during the critical period. Cases of other children such as *Chelsea* (Curtiss, 1988) who were also deprived of the opportunity to acquire language during the critical period show similar language impairments. These children, like Genie, suffered significant and permanent language impairment because they were not given the opportunity to acquire language during the critical period.

While there is little doubt that children who do not acquire their first language during the critical period are significantly affected and, in fact, are unable to acquire more than the most rudimentary features of language, the picture for second language learners is more complex. Second language learners are different from first language learners such as Genie and Chelsea in that second language learners have acquired a native language within the critical period.

In studies comparing intuitions about what is correct or incorrect in a language (for example, is the following a good English sentence: *There's two people at the door?),* learners who began acquiring a second language early in life with those who began the task later report differences in the language patterns of the two groups, with younger learners exhibiting essentially universal success and older learners exhibiting more variable degrees of attainment with many, if not most, falling significantly short of native-like performance on linguistic tests (see Coppieters, 1987; DeKeyser, 2000; Johnson & Newport, 1989; Moyer, 1999; Patkowski, 1980).

While there is little disagreement over the differential success of early language learners over late learners, there remains significant controversy over nearly every other aspect of the issue, such as the age at which learners lose their language learning advantage, the question of whether it is impossible for late learners to reach native-like competency in the L2, whether the maturational effects are indeed best characterized as a critical or sensitive period, and whether the cause of differential success is due to maturational constraints or to other social, neurobiological, or psychological factors (cf. Marinova-Todd, Marshall, & Snow, 2000 for important caveats).

Hyltenstam and Abrahamsson (2003) make the case that *biological scheduling*, *exercise* of the language acquisition system, and social-psychological factors interact in complex ways in determining the ultimate success of second language learners, with universal success only in the earliest language learners. As age of onset of second language learning increases and the biological advantage of early learning declines, environmental factors play an increasingly larger role in the ultimate attainment of the language learner. Hyltenstam and Abrahamsson suggest that:

> … the role of social/psychological factors becomes increasingly important with age. At least up to the age of onset of 6 or 7, all learners will automatically reach levels that

> allow them to pass as native speakers—provided that there is sufficient input and that the learning circumstances are not deficient. The relatively early phase of the maturation process thus allows for learning to result in seemingly native-like proficiency from mere L2 exposure. With increasing age of onset after this age, however, certain social/psychological factors must be increasingly advantageous in order to compensate for the successively negative effects of maturation. (2003, p. 575)

Thus, while early learners have the clear advantage over late language learners, there are many cases in which second language learners achieve extremely high proficiency in another language. As Hyltenstam and Abramsson (2003) suggest, other factors that do not necessarily play a major role in normal first language acquisition do have the potential to positively affect the second language acquisition process.

Input, Interaction, Output

In the previous section we discussed issues related to the creation of a second language system. We emphasized various linguistic factors that are crucial to the understanding of the types of linguistic systems that learners are able to create in learning a second language. In the following section we will deal with individual characteristics that are known to impact language learning. In this section we begin with a discussion of the ways in which learners obtain the linguistic information that serves as the basis for their linguistic generalizations.

Input

A common belief about second language learning, particularly learning that takes place in a classroom context, is that it proceeds best when teachers (via textbooks and materials) present new linguistic information, perhaps accompanied by explanation. This is followed by practice in which learners use the new linguistic information as a way of reinforcing what has been presented. In this section, we will see that learning involves a complex interplay of information, language use, and feedback. Learners are not passive recipients of new linguistic information but rather are individuals who actively try to sort out information about the language being learned. In other words, they are actively creating interlanguages with relevant information from the input.

Input is the linguistic data that learners are exposed to as they are learning another language. These data are available through reading or listening (or signing in the case of sign languages). Another term used for input is *positive evidence*, which comes from a UG framework and, simply put, refers to the linguistic information that is used to create a grammar. One could say that input is the most important part of the process because languages are not learned in a vacuum and language learning cannot take place without input.

Given the importance of input, it is necessary to consider the nature of input. The following example in Table 12.2 illustrates its changing nature depending on the proficiency level of the learners. Kleifgen (1985) finds differences in the way a single teacher (in this case a kindergarten teacher) addresses different students in a class.

As can be seen from Table 12.2, as the proficiency level decreases, so does the teacher's syntactic sophistication and the level of vocabulary (e.g., *great big pointed hat* vs. *big, big, big hat*). Other characteristics of modified input (also known as *foreigner talk*) are: slower rate and clearer

Table 12.2 Talk to a Kindergarten Class

To a NS group of kindergarten students: These are babysitters taking care of babies. Draw a line from *Q* to *q*. From *S* to *s* and then trace.
To a single NS: Now, Johnny, you have to make a great big pointed hat.
To an intermediate level NS of Urdu: Now her hat is big. Pointed.
To a low intermediate level NS of Arabic: See hat? Hat is big. Big and tall.
To a beginning level NS of Japanese: Big, big, big hat.
To a beginning level NS of Korean: Baby sitter. Baby.

articulation, differences in vocabulary (e.g., higher frequency vocabulary items, less slang, and few idioms), simpler syntax (e.g., short and simple sentences, new information at end of sentence).

In understanding how second and foreign languages are learned, we need to consider what the functions are of modified speech. Although we don't have studies of motivation for this type of reduced speech, we can assume that at least one factor is comprehension: by hearing speech that has been simplified in the ways just described, the second language learner will be better able to understand. And, it is uncontroversial to state that without understanding, learning will not take place. Although understanding alone does not guarantee that learning will occur, it does set the scene to enable learning to take place. Crucial to the success of any conversation and to language learning in general is the ability to understand and to be understood.

Another area of input that needs to be considered is frequency of occurrence. Within certain frameworks of language learning (namely the innatist view discussed earlier), no mention is made of frequency. That is, it is not specified whether a one-time encounter with a particular language feature is sufficient to trigger a change in a learner's representation of language or whether multiple instances are required. Ellis (2002), taking a usage-based approach to acquisition, maintained that learning takes place on the basis of the frequency of exemplars in the input. That is, learners are sensitive to the frequency of exemplars as they abstract regularities from the input. As Ellis states:

> Frequency is a necessary component of theories of language acquisition and processing. In some guises it is a very rudimentary causal variable. Learners analyze the language input that they are exposed to; practice makes perfect. In other guises it is incredibly complex. The multiplicity of interacting elements in any system that nontrivially represents language makes the prediction of the patterns that will eventually emerge as difficult as forecasting the weather, the evolution of an ecological system or the outcome of any other complex system. (p. 178)

Note, however, that Ellis claims that frequency is a necessary factor, but he does not say that it is a sufficient condition. In other words, frequency is not the sole explanation for acquisition, but interacts with other factors such as salience and complexity among others.

Interaction

As mentioned previously, when one thinks of a typical language classroom, in many instances, a grammatical form is presented and then practice comes in the form of using that structure, often in a conversational setting. Research has shown that what happens during a conversation is more than just practice and can actually contribute to learning (Gass & Varonis, 1994; Mackey, 1999). This is known as the Interaction Hypothesis and we turn now to an explanation of how this happens. Long (1996) puts it as follows:

> *Negotiation for meaning,* and especially negotiation work that triggers *interactional* adjustments by the NS or more competent interlocutor, facilitates acquisition because it connects input, internal learner capacities, particularly selective attention, and output in productive ways (pp. 451–452).

Negotiation for meaning refers to those instances in conversation when participants interrupt the flow of the conversation in order for both parties to understand what the conversation is about. In conversations between learners and native speakers or proficient speakers of the second language, negotiations are frequent. An example of a negotiation exchange in (4) below comes from Pica, 1987 (p. 6). In this case, the negotiation occurs following a pronunciation problem. The learner is made aware of the problem through the native speaker's indications of nonunderstanding (lines 3 and 5).

4. Negotiation exchange (NS = native speaker; NNS = nonnative speaker)
   1. **NNS:** And they have the chwach there.
   2. **NS:** The what?
   3. **NNS:** The chwach—I know someone that—
   4. **NS:** What does it mean?
   5. **NNS:** Like um like American people they always go there every Sunday
   6. **NS:** Yes?
   7. **NNS:** You kn—every morning that there pr-that -the American people get dressed up to got to um chwach.
   8. **NS:** Oh to church—I see.

It is negotiation that allows learners to understand the conversation and hence the input. And, importantly, as we noted earlier, comprehension is an essential element of learning. Beyond that, the negotiation itself provides a form whereby the learner focuses attention on problem areas, in this instance a pronunciation problem.

Not only are there numerous instances of negotiation, but conversations involving learners and proficient speakers are modified in other ways. Long (1980) was the first to point out that conversations involving nonnative speakers exhibited forms that did not appear to any significant degree when only native speakers were involved. For example, confirmation checks (*Is this what you mean*?), comprehension checks (*Do you understand*? *Do you follow me*?), and clarification

requests (*What*? *Huh*?) are peppered throughout conversations in which there is a nonproficient nonnative speaker participant. In addition, one finds different questions that appear to be used to help the learner. Long (1983, p. 180) provides the example in (5) in which, in response to an indication of nonunderstanding (*huh?*), the native speaker narrows down the topic (California → Los Angeles) to make it easier for the learner to respond appropriately.

5. Narrowing down the topic
   NS: Do you like California?
   NNS: Huh?
   NS: Do you like Los Angeles?
   NNS: Uhm …
   NS: Do you like California?
   NNS: Yeah, I like it.

These conversational tactics provide the nonnative speaker with as much information as possible as she attempts to ascribe meaning to the native speaker's stream of sounds. At times, a proficient speaker will ask an *or-choice* question, as in example (6) which comes from an English as a second language (ESL) classroom. This exchange took place during the first class after a long holiday break. The teacher had asked a student what he did over the break. He responded that he had just relaxed.

6. Or-choice question
   NS: Where did you relax?
   Silence
   NS: Did you relax out of town or in East Lansing?
   NNS: East Lansing.

In these examples, the effect of native speaker and nonnative speaker modifications (whether intentional or not) is to aid the nonnative speaker in understanding. Thus, the learner is assisted (possibly as a show of solidarity—see work by Aston, 1986, & Hawkins, 1985) by others in understanding and in producing language appropriate to the situation. However, one must remember that comprehension is not the same as acquisition; comprehension, in the usual sense of the word, refers to a single event, whereas acquisition refers to a permanent state, or a process.

In thinking more specifically about the function of interaction, Long provides the following explanation:

> It is proposed that environmental contributions to acquisition are mediated by selective attention and the learner's developing L2 processing capacity, and that these resources are brought together most usefully, although not exclusively, during *negotiation for meaning.* Negative feedback obtained during negotiation work or elsewhere may be facilitative of L2 development, at least for vocabulary, morphology, and language-specific syntax, and essential for learning certain specifiable L1–L2 contrasts. (1996, p. 414)

Long refers to two important concepts: negative feedback and attention. Negative feedback refers to information provided to a learner that there is a problem with something that she or he has said. What negative feedback does not do, however, is provide information about the nature of the error or what has to be done to *fix* it. Thus, in (7), the learner of Italian understands that there is

a problem with what she has said (she has used the incorrect ending on *tazzi*), but doesn't know what the correct form is.

7. From Mackey, Gass, McDonough (2000)
   NSN: C'è due tazzi.
   'There is two cups (masculine plural ending, but should be feminine plural.).'
   INT: Due tazz-come?
   'Two cup—what?'
   NNS: Tazzi, dove si puó mettere té, come se dice questo?
   'Cups (masculine plural.), where one can put tea, how do you say this?'

But, importantly, the learner's attention is drawn to the problem. This, it has been argued, sets the scene for later learning (Gass, 1997). As a first step to learning, a learner must be aware of a need to learn. Negotiation and feedback of the sort that takes place in conversation is a means to focus a learner's attention on just those areas of language that do not match those of the language being learned.

We now turn to the mechanism that may be at the heart of the interaction hypothesis (as Long, 1996, noted)—selective attention. Negotiation and other types of correction focus learners' attention on parts of their language that diverge from the language they are learning. And, it has been claimed that attention is a crucial part of learning. For example, according to Schmidt (2001) attention "Is necessary in order to understand virtually every aspect of second language acquisition" (p. 1). He also suggests, that "SLA is largely driven by what learners pay attention to and notice in target language input …" (p. 2).

What is generally agreed upon in the field of second language acquisition is that attention is important in order to account for the ways that learners sort through the large amounts of sometimes incoherent and incomprehensible data that they are exposed to. It is uncontroversial to state that learners are exposed to more input (raw data) than they can cope with. Therefore, there must be some mechanism to help isolate parts of the input as learners create and test hypotheses. One way in which the input can be made more manageable is to focus attention on a limited and hence controlled amount of data at a given point in time. And this returns us to the concept of negotiation, the question being: what happens during a negotiation event that allows learners to utilize the content of the negotiation to advance their own knowledge? Long's (1996) statement, given earlier, suggests an important role for attention, as does Gass's (1997, p. 132) statement that "attention, accomplished in part through negotiation is one of the crucial mechanisms in this process."

It is through interaction that a learner's attention is focused on a specific part of the language, particularly on mismatches between target language (TL) forms and learner-language forms. This can happen through negotiation, as noted earlier, or even through less direct means, such as recasts, as in the examples in (8) below from Philp (2003).

8. Recasts
   a. **NNS:** Why they want to sell to the house?
      NS: Why do they want to sell the house?
      NNS: Why do they want to sell the house?
   b. **NNS:** Does does he uh the hand uh on the hand ah what what.
      NS: What is he carrying?
      NNS: Yeah what he is carry?

In the first example, the learner corrects her error, whereas in the second she gets it only partly correct. But, in both cases, it is argued that if learning does not necessarily take place *on the spot*

(which it probably does not), there is at least recognition of a problem and the scene is set for later learning.

Of course, a prerequisite to viewing the role of attention within an interactional context in the way that we have described is that learners are capable of noticing mismatches. Schmidt and Frota (1986) reported on the learning of Portuguese in which the learner documented the noticing and subsequent learning of new forms. In this study, the learner kept a language-learning diary and therefore provided evidence of what he had noticed. The authors were able to relate instances of noticing with later use.

The recognition of the importance of attention is widely recognized although there is controversy over whether attention relies on capacity limits. Are attentional resources limited or unlimited? One model, the interference model, is essentially a noncapacity limited model. As Robinson (2003) states, "Increasing the number of stimuli and response alternatives or the similarity between them will sometimes lead to confusion, reducing performance efficiency. This can be caused by competition for the same types of codes during information flow, or by *cross-talk* between similar codes" (pp. 644–645). In this view, there are no limits to attentional capacity; rather, interference is a matter of *involuntary attention shift*.

However, in other views, it is assumed that the human brain is equipped with a single, limited attentional processing system that allows for a certain amount of input to be attended to at one time (Anderson, 1983; Kahneman, 1973; Kihlstrom, 1987). Then, the fact that learners are constantly exposed to input, not all of which is of use, is explained in terms of cognitive overload. In this view, learners have a mechanism that allows them to filter out some language stimuli from the input, resulting in input that is ultimately more manageable and easily *digestible*, thus ready for further processing. What is isolated is clearly dependent on a learner's stage of development and readiness to learn (Gass, Svetics, & Lemelin, 2003; Mackey, 1999).

The role of memory in connection with attention is important. Williams (1999) found a strong relationship between individual differences in memory capacity and learning outcomes in an experiment involving a semiartificial form of Italian. He also recognized the importance of the relationship between long-term memory and vocabulary learning.

Mackey, Philp, Egi, Fujii, and Tatsumi (2002) considered the relationship between working memory capacity and learner reports of noticing in an interactional context. They found a relationship between the composite scores on a working memory test and their reports of noticing. This may be one factor (although clearly not the only one) in determining noticing. Other factors may include proficiency level and other individual differences across learners.

Output

The final area we consider in this section is the role of *output*, or, more simply put, production or language use. A limitation of input is that one can often interpret meaning by understanding the meanings of words without regard to the order of those words. For example, if one hears only the words *girl*, *jumped, on, table* it is likely that the meaning *The girl jumped on the table* is the one that will be assumed rather than the more unusual *The table jumped on the girl*. Little knowledge, other than knowing the meanings of the words and knowing something about real-world events, is needed for correct understanding. However, when producing language, certain decisions have to be made as to the order of words and other necessary features of the syntax. Production then "May force the learner to move from semantic processing to syntactic processing" (Swain, 1985, p. 249). Swain (1995, p. 128) further claimed that "output may stimulate learners to move from the semantic, open-ended, nondeterministic, strategic processing prevalent in comprehension to the

complete grammatical processing needed for accurate production. Output, thus, would seem to have a potentially significant role in the development of syntax and morphology."

We present four possible ways that language learning takes place through production: (a) testing hypotheses about the structures and meanings of the target language; (b) receiving crucial feedback for the verification of these hypotheses; (c) developing automaticity in interlanguage production; and (d) forcing a shift from more meaning-based processing of the second language to a more syntactic mode.

Producing language can be a way of testing a hypothesis, either consciously or unconsciously. To relate this to our previous discussion on interaction, through negotiation and through feedback, learners can be made aware of an erroneous hypothesis. That is, the activity of using language helps create a degree of analyticity that allows learners to think about language. The example in (9) comes from a study by Mackey et al. (2000) who used a stimulated recall format (see Gass & Mackey, 2000) to elicit learners' thoughts about interactions. In this example, the learner and interviewer (fluent speaker of Italian) are trying to identify differences in two similar pictures.

9. Language production as a way of thinking about language

INT = interviewer

NNS: *poi un bicchiere*
then a glass
INT: *un che, come?*
a what, what?
NNS: *bicchiere*
glass

Watching a video of the interaction immediately following the interaction and reflecting on it, the learner said:

> I was drawing a blank. Then I thought of a vase but then I thought that since there was no flowers, maybe it was just a big glass. So, then I thought I'll say it and see. Then, when she said "*come*" (what?), I knew that it was completely wrong.

The comment *I'll say it and see* suggests that she was using the conversation as a way to see if a hypothesis was correct or incorrect.

A second important function of producing language is feedback. Feedback itself provides information to the learner of a potential problem (or of a correct form). Feedback often results in negotiation of the problem by providing learners with information about incorrect forms, as can be seen in (10) following from Nobuyoshi and Ellis, 1993, p. 204.

10. Feedback

NNS: He pass his house.
NS: Sorry?
NNS: He passed, he passed, ah, his sign.

It is important to note that we are often left with the unknown factor of longer-term retention.

If we are to claim that feedback and negotiation are important to learning, we have to determine the extent to which learners are aware of the information that is being provided through feedback or the negotiation sequence. The issue is: What do learners perceive? In a study by Mackey, Gass, and McDonough (2000), data were collected from 10 learners of English as a second language and

7 learners of Italian as a foreign language. The study explored learners' perceptions about feedback provided to them through interaction. In the interactions, learners received feedback focused on a range of morphosyntactic, lexical, and phonological forms. After completing the tasks, learners watched videotapes of their previous interactions and were asked to introspect about their thoughts at the time the original interactions were in progress. The results showed that learners were relatively accurate in their perceptions about lexical, semantic, and phonological feedback. However, morphosyntactic feedback was generally not perceived as such. Consequently, it is not always clear that learners perceive feedback in the way it was intended (see also Hawkins, 1985). A further complication comes from research by Gass and Lewis (2007) who found different perceptual emphases of true second language learners and heritage language learners with the former perceiving feedback more often as grammatical feedback and the latter perceiving feedback more often as semantic feedback.

The third function we point out reflects the traditional view of output, that is, as a means for developing fluency and automaticity of processing. Certain processes are deliberate, requiring a significant amount of time and working memory capacity. Others are routine and automatic, involving less time and capacity. McLaughlin (1987, p. 134) claimed that automatization involves "A learned response that has been built up through the consistent mapping of the same input to the same pattern of activation over many trials." Here we extend this notion to output, claiming that the consistent and successful mapping (practice) of grammar to output results in automatic processing (see also Loschky & Bley-Vroman, 1993).

The final area we look at is an understanding of the difference between meaning-based and grammatically based use of language. Swain's initial hypothesis stated that output "may force the learner to move from semantic processing to syntactic processing" (1985, p. 249). In other words, the learner moves from meaning-based processing to word order-based processing.

As Gass and Selinker (2001, p. 290) put it:

> Output provides learners the opportunity to produce language and gain feedback, which through focusing learners' attention on certain local aspects of their speech may lead them to notice either (a) a mismatch between their speech and that of an interlocutor (particularly if as part of the feedback a linguistic model is provided) or (b) a deficiency in their output. Noticing, then, leads to reassessment, which may be an on-the-spot reassessment or involve longer-term complex thinking about the issue. This latter process may be bolstered by the gathering of additional information through a variety of sources (e.g., input, direct questioning, looking in grammar books, and dictionaries). This, in essence, is the process of learning. (see also Swain & Lapkin, 1995)

Individual Factors

In previous sections we discussed how the age of the learner, the learner's first language, and the linguistic environment can impact the acquisition process. In addition to these factors, there are other factors that can vary from individual to individual that also play a potential role in the rate of acquisition and ultimate success of a given language learner. Considering the many ways in which individuals can vary, numerous individual factors have the potential to impact, either positively or negatively, the process of learning a second language. For example, researchers have explored the potential impact on language learning of individual characteristics such as anxiety, introversion

versus extroversion, empathy, memory, inhibition, risk taking, self-esteem, motivation, aptitude, learning styles, and learning strategies, which are behaviors or thought processes that the learner engages in that potentially facilitate or inhibit learner success, but unfortunately are beyond the scope of this paper (see Dörnyei, 2005).

Summary and Conclusion

This brief chapter has provided some of the major concepts needed to understand how learning a second or foreign language takes place. We have shown that learners are actively involved in forming grammars. There are many elements that are potentially involved, namely the possible role of Universal Grammar, age of acquisition, the first language, the amount and quality of input and interaction as well as other individual factors such as motivation, aptitude, and attitude. We have argued that factors such as the specific language learners are exposed to (input), the conversational interactions that learners are engaged in, and their own linguistic production (output) serve important functions as learners work to create second language grammars. We have also pointed out that such factors as attitude, aptitude, and motivation may affect learning.

Learning a second language is a long, difficult, and arduous process and is rarely complete, in the sense of knowing the second language as native speakers of that language do. This does not mean that second language speakers cannot be fully functional in the second language, only that there are generally endpoint differences, for example differences in pronunciation as well as frequent differences in morphology, syntax, and pragmatics.

List of Key Words and Concepts

Advanced language learner, Bilingualism, Chunked learning, Critical period, Heritage speaker, Interference, Interaction Hypothesis , Interlanguage, Foreigner talk, Input, Interaction, Linguistic principles, Native language, Near native, Negative Feedback, Output, Positive evidence, Second language learner, Second language speaker, Sensitive period, Transfer, Universal grammar, U-shaped learning

Internet Sites Related to Second Language Acquisition

Second Language Acquisition Topics: http://homepage.ntlworld.com/vivian.c/SLA/

The International Commission on Second Language Acquisition: http://www.hw.ac.uk/langWWW/icsla/icsla.htm

European Second Language Association: http://www.swan.ac.uk/cals/eurosla/

Discussion Questions

1. Find two empirical articles from a journal of second language acquisition research (e.g., *Studies in Second Language Acquisition, Language Learning* and *The Modern Language Journal)*. What level learners do they use? How is this level defined?

2. Frequently teachers present language information to their students expecting them to learn it after much practice in class. Often, however, this is not the case; the same mistakes continue. Why do you think this is the case?
3. The term second language learning refers to a wide range of learning environments, including a) learning in a classroom where the language being learned is spoken, b) learning in the environment where the language being learned is spoken, but not in a classroom, and c) learning in a classroom in an environment where the language being learned is not spoken—that is, the language is for all practical purposes only available in the classroom. What might the actual differences be in terms of learning in these three contexts?
4. A child learner of English (native speaker of Japanese) said the following:
   a. Do you know?
   b. How do you do it?
   c. Do you have coffee?
   d. Do you want this one?

   Do you think that this child has learned how to ask questions in English?
   Now consider the following questions, said by the same child one month later.
   a. What do you doing, this boy? [=what is this boy doing?]
   b. What do you do it, this, froggie? [=What is this froggie doing?]
   c. What do you doing? [=What are you doing?]
   d. What do you drinking, her? [=What is she drinking?]

   Do you still think that she knows how to form English questions? What generalization has she made about English questions? Does the second set of data cause you to rethink your conclusions about the first set of data? Why or why not?

5. Some languages have possessive phrases that follow nouns, as in the following French example:

   Le chien de mon ami
   the dog of my friend

   In English, the situation is more complicated and two structures are possible, one in which the possessor follows the noun and one in which it precedes it.
   a. The dog of my friend
   b. My friend's dog

   Whereas both of these English sentences are possible, the first one (a) sounds strange. On the other hand, of the following two groups of sentences in English:
   c. The leg of the table
   d. A leg of lamb
   e. The table's leg
   f. A lamb's leg

   It is the second group (e and f) that is less likely to be said. How would you explain this? What would you predict regarding a learner's interlanguage production? Considering both transfer and input, how would a French learner of English figure out the facts of English?

   A French speaker learning English has to go from one form to two, whereas an English learner learning French would go from two forms to one. Which do you think would be more difficult, and why?

6. What do you think are characteristics of good language learners?

7. If you were designing a study on advanced language learners, how would you operationalize the concept? That is, how would you determine who should or should not be in your subject pool?

Suggested Research Projects

1. Make a drawing of a nonsense object or animal. Tell a young child that that is a "wug." Next, show the child a picture of two of these objects and say to the child: "Now there are two _____." Have the child fill in the blank. Do this a few times with different words. Try this with children of different ages starting with young children. At what age do they start using the regular English plural? What can you conclude about the children's ability to generalize forms?

   Now try the same activity with children of different first languages who are learning English (or another language). Do the same patterns hold? Vary the ages of the children and determine at what age child learners of English begin to acquire regular English plurals. Do this with children learning a second language as well as those who are growing up bilingual.
2. Find an article that deals with the acquisition of a language that you are interested in. Make sure that there is enough detail to conduct a replication. Find appropriate participants and replicate the study. Do your results coincide with those of the original author(s)? If not, why do you think that that is the case?

Suggested Readings

Gass, S., & Selinker, L. (2001). *Second language acquisition: An introductory course*. Mahwah, NJ: Lawrence Erlbaum Associates.

Gass, S., & Selinker, L. (2008). *Second language acquisition: An introductory course*. London: Taylor & Francis.

Lightbown, P., & Spada, N. (2006). *How languages are learned* (Rev. ed.). Oxford, UK: Oxford University Press.

Mitchell, R., & Myles, F. (2004). *Second language learning theories* (2nd edition). London: Hodder & Stoughton Educational.

VanPatten, B. (2003). *From input to output: A teacher's guide to second language acquisition*. Boston: McGraw Hill.

References

Akmajian, A., Demers, R. A., Farmer, A. K., & Harnish, R. M. (1995). *Linguistics: An introduction to language and communication*. Cambridge, MA: MIT Press.

Anderson, J. R. (1983). *The architecture of cognition*. Cambridge, MA: Harvard University Press.

Aston, G. (1986). Trouble–shooting in interaction with learners: The more the merrier? *Applied Linguistics, 7*, 128–143.

Bardovi-Harlig, K. (2004). *Pragmatic competence of the advance learner*. Paper prepared for the High-level language ability research hub. Department of Education.

Bartning, I. (1997). L'apprenant dit avancé et son acquisition d'une langue étrangère: Tour d'horizon et esquisse d'une caractérisation de la variété avancée. *Acquisition et Interaction en Langue Étrangère, 9*, 9–50.

Bhatia, T. (2004). Introduction. In T. Bhatia & W. Ritchie (Eds.), *The handbook of bilingualism* (pp. 5–6). Oxford, UK: Blackwell Publishers.

Bhatia, T. & Ritchie, W. (Eds.), (2004). *The handbook of bilingualism*. Oxford, UK: Blackwell Publishers.

Birdsong, D. (Ed.). (1999). *Second language acquisition and the critical period hypothesis*. Mahwah, NJ: Lawrence Erlbaum Associates.

Cenoz, J. (in press). Review of T. Bhatia & W. Ritchie (Eds.), *The handbook of bilingualism*. In *Studies in second language acquisition.*

Cenoz, J., & Jessner, U. (Eds.). (2000). *English in Europe: The acquisition of a third language*. Clevedon: Multilingual Matters.

Chomsky, N. (1981). Principles and parameters in syntactic theory. In N. Hornstein & D. Lightfoot (Eds.), *Explanation in linguistics: The logical problem of language acquisition* (pp. 32–75). London: Longman.

Coppieters, R. (1987). Competence differences between natives and near-native speakers. *Language*, *63*, 544–573.

Curtiss, S. (1977). *Genie: A psycholinguistic study of a modern-day "Wild Child."* New York: Academic Press.

Curtiss, S. (1988). Abnormal language acquisition and the modularity of language. In F. J. Newmeyer (Ed.), *Linguistics: Vol. II. The Cambridge Survey* (pp. 99–116). Cambridge: Cambridge University Press.

Davies, A. (1991). *The native speaker in applied linguistics.* Edinburgh: Edinburgh University Press.

Davies, A. (2003a). *The native speaker: Myth and reality*. Clevedon, Avon: Multilingual Matters.

Davies, A. (2003b). The native speaker in applied linguistics. In A. Davies & C. Elder (Eds.). *Handbook of applied linguistics* (pp. 431–450). New York: Blackwell.

De Houwer, A. (1995). Bilingual language acquisition. In P. Fletcher & B. MacWhinney (Eds.), *The handbook of child language* (pp. 219–250). Oxford, UK: Blackwell Publishers.

DeKeyser, R. M. (2000). The robustness of critical period effects in second language acquisition. *Studies in Second Language Acquisition*, *22*(4), 493–533.

Deucher, M., & Quay, S. (2000). *Bilingual acquisition: Theoretical implications of a case study*. Oxford, UK: Oxford University Press.

Dörnyei, Z. (2005). *Psychology of the language learner: Individual differences in second language acquisition*. Mahwah, NJ: Lawrence Erlbaum Associates.

Edwards, J. (2004). Foundations of bilingualism. In T. Bhatia & W. Ritchie (Eds.), *The handbook of bilingualism* (pp. 7–31). Oxford, UK: Blackwell Publishers.

Ellis, N. (2002). Frequency effects in language processing. *Studies in Second Language Acquisition, 24*(2), 143–188.

Epstein, S., Flynn, S., & Martohardjono, G. (1996). Second language acquisition: Theoretical and experimental issues in contemporary research. *Brain and Behavioral Sciences, 19*, 677–758.

Eubank, L. (1994). Optionality and the initial state in L2 development. In T. Hoekstra & B. D. Schwartz (Eds.), *Language acquisition studies in generative grammar* (pp. 369–388). Amsterdam: John Benjamins.

Eubank, L. (1996). Negation in early German-English interlanguage: More valueless features in the L2 initial state. *Second Language Research, 12*, 73–106.

Fishman, J. (2001). 300-plus years of heritage language education in the United States. In J. Peyton, D. Ranard, & S. McGinnis (Eds.), *Heritage languages in America preserving a national resource* (pp. 81–97). Washington, DC: Center for Applied Linguistics.

Gass, S. (1996). Second language acquisition and linguistic theory: The role of language transfer. In W. Ritchie & T. K. Bhatia (Eds.), *Handbook of second language acquisition* (pp. 317–345). San Diego: Academic Press.

Gass, S. (1997). *Input, interaction, and the second language learner*. Mahwah, NJ: Lawrence Erlbaum Associates.

Gass, S. (in press). Language teaching: Environment, presentation & complexity. In W. Hu (Ed.). *ELT in China: Papers presented at the international conference on ELT in China in 2004*. Beijing: Foreign Studies University Press.

Gass, S., & Lewis, K. (2007). Perceptions of interactional feedback: Differences between heritage and non-heritage language learners. In A. Mackey (Ed.), *Conversational interaction in second language acquisition: A series of empirical studies* (pp. 173–196). Oxford: Oxford University Press.

Gass, S., & Mackey, A. (2000). *Stimulated recall methodology in second language research*. Mahwah, NJ: Lawrence Erlbaum Associates.

Gass, S., & Selinker, L. (Eds.). (1992). *Language transfer in language learning.* Amsterdam: John Benjamins.

Gass, S., & Selinker, L. (2001). *Second language acquisition: An introductory course.* Mahwah, NJ: Lawrence Erlbaum Associates.

Gass, S., Svetics, I., & Lemelin, S. (2003). Differential effects of attention. *Language Learning, 53*, 495–543.

Gass, S., & Varonis, E. (1994). Input, interaction and second language production. *Studies in Second Language Acquisition, 16,* 283–302.

Goldschmidt, M. (1996). From the addressee's perspective: Imposition infavor-asking. In S. Gass & J. Neu (Eds.), *Speech acts across cultures* (pp. 241–256). Berlin: Mouton de Gruyter.

Hakuta, K. (1974). Prefabricated patterns and the emergence of structure in second language learning. *Language Learning, 24,* 287–297.

Hanania, E. (1974). *Acquisition of English structures: A case study of an adult native speaker of Arabic in an English–speaking environment.* Unpublished doctoral dissertation, Indiana University, Bloomington.

Hawkins, B. (1985). Is an "appropriate response" always so appropriate? In S. Gass & C. Madden (Eds.), *Input in second language acquisition* (pp. 162–178). Rowley, MA: Newbury House.

Henkes, T. (1974). *Early stages in the non-native acquisition of English syntax. A study of three children from Zaire, Venezuela, and Saudi Arabia.* Unpublished doctoral dissertation, Indiana University, Bloomington.

Hyltenstam, K., & Abrahamsson, N. (2003). Maturational constraints in SLA. In C. Doughty & M. H. Long (Eds.), *The Handbook of second language acquisition* (pp. 539–588). Oxford, UK: Blackwell Publishers.

Johnson, J. S., & Newport, E. (1989). Critical period effects in second language learning: The influence of maturational state on the acquisition of English as a second language. *Cognitive Psychology, 21*, 60–99.

Kahneman, D. (1973). *Attention and effort.* Englewood Cliffs, NJ: Prentice Hall.

Kasper, G., & Rose, K. R. (2002). *Pragmatic development in a second language.* Oxford, UK: Blackwell Publishers.

Kellerman, E. (1977). Towards a characterization of the strategy of transfer in second language learning. *Interlanguage Studies Bulletin, 21*, 58–145.

Kellerman, E. (1978). The empirical evidence for the influence of L1 on interlanguage. In A. Davies, C. Criper, & A. P. R. Howatt (Eds.), *Interlanguage* (pp. 98–122). Edinburgh: Edinburgh University.

Kellerman, E. (1979). Transfer and non-transfer: Where we are now. *Studies in Second Language Acquisition, 2,* 37–57.

Kihlstrom, J. (1987). The cognitive unconscious. *Science, 237,* 1445–1452.

Kleifgen, J. (1985). Skilled variation in a kindergarten teacher's use of foreigner talk. In S. Gass & C. Madden (Eds.), *Input in second language acquisition* (pp. 59–85). Cambridge, MA: Newbury House.

Kroll, J., & Sunderman, G. (2003). Cognitive processes in second language learners and bilinguals: The development of lexical and conceptual representations. In C. Doughty & M. H. Long (Eds.) *Handbook of second language acquisition* (pp. 104–129). Oxford, UK: Blackwell Publishers.

Lenneberg, E. (1967). *Biological Foundations of Language*. New York: Wiley.

Long, M. H. (1980). *Input, interaction and second language acquisition.* Unpublished doctoral dissertation, University of California, Los Angeles.

Long, M. H. (1983). Linguistic and conversational adjustments to non–native speakers. *Studies in Second Language Acquisition, 5,* 177–193.

Long, M. H. (1990). Maturational constraints on language development. *Studies in Second Language Acquisition*, *12*, 251–285.

Long, M. H. (1996). The role of the linguistic environment in second language acquisition. In W. Ritchie & T. Bhatia (Eds.), *Handbook of second language acquisition* (pp. 413–468). San Diego, CA: Academic Press.

Loschky, L., & Bley-Vroman, R. (1993). Grammar and task-based methodology. In G. Crookes & S. Gass (Eds.), *Tasks and language learning: Integrating theory and practice* (pp. 122–167). Clevedon, Avon: Multilingual Matters.

Mackey, A. (1995). *Stepping up the pace—input, interaction and interlanguage development: An empirical study of questions in ESL*. Unpublished doctoral Dissertation, University of Sydney, Australia.

Mackey, A. (1999). Input, interaction and second language development. *Studies in Second Language Acquisition, 21,* 557–587.

Mackey, A., Gass, S., & McDonough, K. (2000). How do learners perceive implicit negative feedback? *Studies in Second Language Acquisition, 22*, 471–497.

Mackey, A., Philp, J., Egi, T., Fujii, A., & Tatsumi, T. (2002). The outcomes of implicit feedback in conversational interaction: An exploration of the role of aptitude in phonological short-term memory. In P. Robinson (Ed.), *Individual differences and instructed language learning* (pp. 181–210). Amsterdam: John Benjamins.

Marinova-Todd, S., Marshall, D. B., & Snow, C. E. (2000). Three misconceptions about age and second-language learning. *TESOL Quarterly, 34*, 9–34.

McLaughlin, B. (1987). *Theories of second language learning.* London: Edward Arnold.

Montrul, S. (2004). Subject and object expression in Spanish heritage speakers: A case of morpho-syntactic convergence. *Bilingualism: Language and Cognition, 7,* 125–42.

Moyer, A. (1999). Ultimate attainment in L2 phonology: the critical factors of age, motivation, and instruction. *Studies in Second Language Acquisition*, *21*, 81–108.

Moyer, A. (2004). *Age, accent and experience in second language acquisition.* Clevedon, Avon: Multilingual Matters.

Nobuyoshi, J., & Ellis, R. (1993). Focused communication tasks and second language acquisition. *English Language Teaching, 47*, 203–210.

Odlin, T. (1989). *Language Transfer*. Cambridge: Cambridge University Press.

Odlin, T. (2003). Cross-linguistic influence. In C. Doughty & M. Long (Eds.), *The handbook of second language acquisition* (pp. 436–486). Oxford, UK: Blackwell Publishers.

Olshtain, E., & Cohen, A. D. (1989). Speech act behavior across languages. In H. W. Dechert & M. Raupach (eds.). *Transfer in Production* (pp. 53–67). Norwood, NJ: Ablex

Patkowski, M. S. (1980). The sensitive period for the acquisition of syntax in a second language. *Language Learning*, *30*, 449–472.

Philp, J. (2003). Constraints on "Noticing the Gap": Nonnative Speakers' Noticing of Recasts in NS-NNS Interaction. *Studies in Second Language Acquisition, 25*, 99–126.

Pienemann, M. (1989). Is language teachable? Psycholinguistic experiments and hypotheses. *Applied Linguistics, 10,* 52–79.

Pienemann, M. (1998). *Language processing and second language development: Processability theory*. Amsterdam: John Benjamins.

Pica, T. (1987). Second–language acquisition, social interaction, and the classroom. *Applied Linguistics, 8,* 3–21.

Polinsky, M. (in press). Heritage language narratives. In O. Kagan & D. Brinton (Eds.), *Heritage languages: A new field emerging*. Mahwah, NJ: Lawrence Erlbaum Associates.

Ringbom, H. (2007). *Cross-linguistic similarity in foreign language learning*. Clevedon: Multilingual Matters.

Robinson, P. (2003). Attention and memory during SLA. In C. Doughty & M. H. Long (Eds.), *Handbook of second language acquisition* (pp. 631–678). Oxford, UK: Blackwell Publishers.

Schmidt, R., & Frota, S. (1986). Developing basic conversational ability in a second language: A case study of an adult learner of Portuguese. In R. Day (Ed.), *Talking to learn: Conversation in second language acquisition* (pp. 237–326). Rowley, MA: Newbury House.

Schmidt, R. (2001). Attention. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 3–32). Cambridge, UK: Cambridge University Press.

Schwartz, B., & Sprouse, R. (1996). L2 cognitive states and the full transfer/full access model. *Second Language Research 12*, 40–72.

Singleton, D., & Lengyel, Z. (Eds.) (1995). *The age factor in second language acquisition*. Clevedon, Avon: Multilingual Matters.

Singleton, D., & Ryan, L. (2004). *Language acquisition: The age factor* (2nd ed.). Clevedon, Avon: Multilingual Matters.

Sorace, A. (1993). Incomplete vs. divergent representations of unaccusativity in nonnative grammars of Italian. *Second Language Research, 9*, 21–47.

Sorace, A. (2003). Near-nativeness. In C. Doughty & M. H. Long (Eds.) *The handbook of second language acquisition* (pp. 130–151). Oxford, UK: Blackwell Publishers.

Swain, M. (1985). Communicative competence: Some roles of comprehensible input and comprehensible output in its development. In S. Gass & C. Madden (Eds.), *Input in second language acquisition* (pp. 235–253). Rowley, MA: Newbury House.

Swain, M. (1995). Three functions of output in second language learning. In G. Cook & B. Seidlhofer (Eds.), *Principle and practice in applied linguistics* (pp. 125–144). Oxford, UK: Oxford University Press.

Swain, M., & Lapkin, S. (1995). Problems in output and the cognitive processes they generate: A step towards second language learning. *Applied Linguistics, 16*, 371–391.

Thomas, M. (2006). Research synthesis and historiography: The case of assessment of second language proficiency. In J. Norris & L. Ortega (Eds.), *Synthesizing research on language learning and teaching* (pp. 279–298). Amsterdam: John Benjamins.

Vainikka A., & Young-Scholten, M. (1996). Gradual development of L2 phrase structure. *Second Language Research 12*, 7–39.

Valdés, G. (2001). Heritage language students: Profiles and possibilities. In J. Peyton, D. Ranard, & S. McGinnis (Eds.), *Heritage languages in America preserving a national resource* (pp. 37–57). Washington, DC: Center for Applied Linguistics.

White, L. (2003). *Second language acquisition and Universal Grammar*. Cambridge, UK: Cambridge University Press.

White, L., & Genesee, F. (1996). How native is near-native? The issue of ultimate attainment in adult second language acquisition. *Second Language Research, 12*, 233–265.

Williams, J. (1999). Memory, attention, and inductive learning. *Studies in Second Language Acquisition*, *21,* 1–48.

Zobl, H. (1982). A direction for contrastive analysis: The comparative study of developmental sequences. *TESOL Quarterly*, *16,* 169–83.

Chapter 13

Primary Language Impairments in Bilingual Children and Adults

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Introduction to Language Impairments and Language Proficiency

Effective communication is essential to successful participation in all aspects of society. Human communication involves sending and receiving messages in an interactive exchange of thoughts, ideas, feelings, and information. The primary vehicle for human communication is language, transmitted through speech, gesture, or writing. Delays or deficits in language ability may negatively affect an individual's interpersonal interactions and achievements at home, school, work, or in the community setting.

At a minimum, proficiency in any single language involves the acquisition of knowledge (consistent form-function mappings) as well as the efficient use of this known information (in terms of the processing speed required during real-time communicative exchanges; Kohnert, 2004a). Each of these knowledge and processing dimensions of the proficiency equation can be further broken down by linguistic levels (e.g., sounds, words and meanings, grammar) and by channels or modes of communication, such as comprehension or production. Skill or proficiency at the processing level involves both efficient access of known forms as well as control of the system in the face of competition from linguistic or nonlinguistic sources. Experimental and clinical measures of bilingual skill are designed to index selected aspects of this overall language proficiency equation. Language proficiency in bilinguals is most often understood in terms of relative cross-linguistic proficiency.

When proficiency is comparable across the two languages, it is called balanced bilingualism. In contrast, when one language is stronger than the other (as is most often the case) this language is considered dominant. The attainment of language proficiency is a complex multidimensional process that relies on the integrity of the individual's sensory, motor, cognitive, neurological, and social systems. Deficits in any one of these systems may result in language impairment. Language impairments negatively affect individuals' interpersonal interactions in their home, school, work, or community settings. For bilinguals, the same underlying disorder affects or manifests in both languages.

Language impairments are determined by referencing typical or "normal" language performance. The parameters of normal or acceptable skills vary with age and language experiences, relative to the individual's social environments. For example, to identify language impairment in a six-year-old boy who has learned Spanish from birth at home and English at school beginning at age four, we must consider his skills, in both languages, as compared to typically developing children of the same age who are learning Spanish and English under similar circumstances. In order to understand the severity of impairment in a bilingual Korean-English speaking woman with communication deficits following a traumatic brain injury, we must understand her skill in each language prior to the injury, as well as the functional need for each language in her daily life.

Language impairments can be described or classified in a number of different ways, including their presumed etiology or cause, the time of onset, as well as the primary systems affected. Deficiencies in language may have many different etiologies, including neurological disease, trauma to the brain, exposure to toxins such as alcohol or other drugs during the gestational period, or severe neglect during early childhood. In some cases, the underlying cause of the observed language impairment is unknown. The time of onset refers to when the language impairment first manifests. Developmental language impairments are presumed to be congenital, or present from birth. In reality, discrepancies between a child's language skills and his or her age peers may not become apparent until much later, frequently between the ages of 2 and 12 years, when the acquisition of spoken and written language skills are at their peak. Developmental disorders stand in contrast to acquired language impairments. Acquired language impairments occur after some period of normal development as the result of injury or disease. Language impairments can also be described in terms of the primary or associated systems affected. Impairments are considered primary when the most obvious area of deficit is in the acquisition or use of language. Secondary or associated language impairments include those that occur with other major conditions, such as congenital hearing loss, progressive dementia, or mental retardation. Many times, language impairments can be described with reference to all three of these traditional descriptive systems.

The focus of this chapter is on primary language impairments in bilingual children and adults. For children, the developmental language impairment of interest is of undetermined etiology and is often referred to as primary or "specific language impairment." In the adult population, we consider aphasia, an acquired language impairment resulting from damage to the language-dominant hemisphere of the brain. Both specific language impairment in children and acquired aphasia in adults are considered primary language disorders because the most obvious system affected is language. As we will see, however, language may not be the only area affected. There may also be subtle deficits in basic cognitive processing mechanisms that have a major impact on either the acquisition or use of language.

The study of primary language disorders in bilingual populations is interesting and important for both theoretical and practical reasons. On the theoretical side, the understanding of language breakdown or inefficiencies in learning two languages can inform our basic understanding of interactions between the cognitive system that support language and the social environment

in which they are acquired and used. This information is necessary in order to develop unified theories of language that encompass typical and atypical speakers of one or multiple languages across the lifespan (cf. Kohnert & Windsor, 2004; Paradis, 2000). At the same time, the study of primary language impairments in children and adults is of enormous practical interest. Given that over half of the global population speaks two (or more languages) and that primary language impairments are high incidence disorders, the ability to provide appropriate clinical and educational services to bilingual individuals with language impairments is a pressing need.

In the following sections we provide an overview of major issues in the study of primary language impairments, first in children, then adults. The causes and characteristics of each language impairment are first presented in monolingual speakers to provide an adequate foundation for understanding the characteristics and issues involved in the study of bilingual speakers with primary language impairments.

Primary or "Specific" Language Impairment in Monolingual Children

Primary developmental language impairments of unknown etiology have long been documented in the literature under a variety of names, including childhood aphasia, language-based learning disabilities, and developmental language disorders. Over the past decade, the most consistent term used in the literature is *specific language impairment* (SLI). SLI is a relatively common developmental impairment, affecting an estimated 5% to 7% of monolingual English-speaking children of school age in the United States (Leonard, 1998; Tomblin et al., 1997). Children with SLI have also been identified in many different countries, representing many different language groups (see Leonard, 1998, for review). Although the cause of SLI is not known, it is presumed to be due to innate factors interacting with the demands of language learning. The study of genetic influences on SLI is in its infancy, but results from investigations with twins suggest that language impairment, as well as language skill, are among the most heritable of all cognitive traits (e.g., Plomin & Dale, 2000; Tomblin & Buckwalter, 1998).

SLI is identified using both inclusionary and exclusionary criteria. The necessary, but insufficient, inclusionary criterion for a diagnosis of SLI is delayed development in the production or comprehension of language. Delays in language are determined based on comparisons to age peers with similar language and cultural experiences. The SLI profile requires that these delays are present despite normal hearing, age-appropriate scores on nonverbal intelligence tests, and no obvious signs of neurological damage. Thus, the conventional SLI profile requires a delay in language in the face of otherwise typical development. In addition, the language delays are not attributed to environmental factors, such as emotional or physical abuse or social deprivation.

The most salient features of SLI change as a function of a number of different factors, including the child's age, features of the input language, and severity of the underlying deficit (e.g., Thal & Katich, 1996). For example, two- and three-year-old children at risk for SLI may have low vocabulary skills and be classified as "late talkers." Those late talkers at greater risk for persisting language delays also demonstrate reduced skills in understanding language. Between the ages of three and six, English-speaking children with SLI typically show marked deficits in the attainment of grammatical morphology relative to their unaffected peers (e.g., Cleave & Rice, 1997; Marchman, Wulfeck, & Ellis Weismer, 1999). Grammatical morphology includes those word endings that indicate tense in English, such as third person singular *s* (*walk*/*walks*) or *ed* (*walk*/*walked*) or the

contractible form of the verb *be* (*I'm* hungry; *she's* happy). Children with SLI who speak languages other than English also seem to have difficulty with grammatical morphology, although perhaps not to the same degree. Results from a number of studies investigating SLI in other languages with rich inflectional morphology systems (such as Italian or Spanish, in which all verbs are inflected) indicate that the impairment in this area is not as severe as it is for English-speaking children with SLI (see Leonard, 1998 for review). It is likely that the consistency of grammatical forms as well as their semantic value or meaning in these languages contribute to patterns of acquisition in both typically developing children and those with SLI.

As children move into the school years, the most salient symptoms of SLI may again change. Despite gains in spoken language, school-age children with SLI may have significant difficulty in learning to read or write, as these are language-based activities (Flax et al., 2003). School-age children with SLI may also have poor spoken and written narrative skills. The overall processing of language may take place at a slightly slower or less efficient rate. For example, in the classroom setting, the child with SLI is often still processing the question asked by the teacher at the same time typically developing children are processing the answer. This reduced efficiency in processing information can have cascading effects on learning and classroom engagement. In the absence of early identification and effective intervention, children with SLI are at risk for academic failure and negative social outcomes (Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998). The following case illustrates the changing face of SLI across early childhood:

> Eli is a seven-year-old boy from a middle income monolingual English-speaking family living in the United States. His parents first became concerned about his language when he was two years old and not yet talking. At this age, his older sister had a vocabulary of well over a hundred words, and was combining them into two and three word phrases (such as *mommy go now*, *more juice please!* and *me do it*). Family and friends tried to reassure them that he was fine—boys are just slower. Despite these reassurances, his parents remained concerned. They were confident Eli was smart because he was great at "doing" things. He seemed perfectly "normal" in all areas, but he still was not talking. He had frequent tantrums and, although his parents realized that some of this was age appropriate, they also felt that they were exacerbated by his difficulty in communicating his wants and needs. Results from a hearing evaluation were within the normal range, but the audiologist referred them to a speech-language pathologist for a full assessment of his communication skills. Results of this assessment confirmed their suspicions. Eli's expressive language skills were significantly behind those of other boys his same age. Eli's skills in language comprehension seemed somewhat better, although these impressions were inconclusive due to Eli's poor compliance in the unfamiliar test environment. Eli's parents were told that about 15 percent of all children have limited productive vocabularies at age 2, with about half of these "late talkers" catching up to their peers on general language measures within a year or two. The remaining late talkers were likely to have persistent delays that could affect reading and academic achievement. There were a number of red flags indicating that Eli might be in the high-risk group. These included undetermined language comprehension skills, and a family history of language delays (two cousins were recently diagnosed with learning disabilities). Eli's parents participated in a training program to learn ways to help develop his communication skills in the home environment. Eli and his mother also participated in direct small group intervention designed to facilitate communication skills. By age four, Eli was talking a lot. He had many hundred words

in his productive vocabulary, frequently used three to five word sentences (with some grammatical errors), his speech was generally easy to understand by those who knew him well and he consistently followed two-step instructions. Despite these impressive gains, his language development remained significantly behind his age peers. During kindergarten and first grade, he received direct intervention from the speech-language pathologist at the school to further develop his expressive and receptive skills for narratives, as well as to facilitate early literacy skills. He currently receives support from the reading specialist at his school. Eli's parents continue to be involved in promoting Eli's language and literacy skills across all environments.

Up to this point, the description of SLI has focused on the language characteristics. This focus is consistent with the vast majority of the empirical and clinical literatures on SLI. However, it is also important to note that differences between monolingual children with SLI and their language intact peers also extend into the nonlinguistic processing domain. That is, although the deficits in language cannot be explained as secondary to obvious neurological, sensory, or cognitive disorders, mounting experimental evidence indicates that children with SLI have subtle weaknesses in basic-level, nonlinguistic cognitive processing skills. For example, studies of monolingual English-speaking children with SLI show that they are slower to detect tones of brief duration, they take longer to respond to simple visual stimuli, and they are slower on simple motor tasks such as finger tapping than their age peers with typical language skills (e.g., Kohnert & Windsor, 2004; Miller, Kail, Leonard, & Tomblin, 2001; Windsor, Milbrath, Carney, & Rakowski, 2001). Few would deny the existence of slowed nonlinguistic processing in children with SLI, but it is a matter of spirited theoretical debate if the relationship between these more general skills and the ability some consider to be "specific" to language is causal in nature, or simply correlated. We also do not yet know if these subtle nonlinguistic processing deficits documented in the experimental literature on SLI can be exploited for clinical diagnostic purposes. Despite these clear unknowns, the increasing frequency with which these nonlinguistic processing deficits have been documented in the monolingual SLI literature do present some interesting possibilities for exploring cognitive-linguistic skills in developing bilinguals, a point we take up further in a later section. In the following section we consider SLI as it relates to developing bilinguals.

SLI and Children Learning Two Languages

SLI and Typically Developing Bilinguals: Areas of Overlap

Developing bilinguals are children who are in the process of learning two languages. These languages can be acquired under diverse circumstances and used for different purposes. The learning of two languages from early infancy is often referred to as simultaneous or native bilingualism. In these cases, two different languages are spoken by the child's parents or primary care providers. Typically developing children learning two languages from birth attain early language milestones at the same ages as their monolingual peers (e.g., Pettito et al., 2001). These children say their first words around their first birthday. By their second birthday most children learning two languages simultaneously have amassed a vocabulary of more than 100 words and combine these words into phrases. By age four, typically developing simultaneous bilinguals use grammatically complex sentences to express a wide range of communication functions. Proficiency in each language is critically dependent on opportunities to use these languages in meaningful communications in a variety of contexts. Some typically developing simultaneous bilinguals will have skills in both

languages that are comparable to monolingual age peers; others will have cross-linguistic skills that are much less balanced. Both of these language proficiency profiles are consistent with typically developing bilingualism. Children with reduced proficiency in only one of the languages spoken in their environment do not have SLI. Rather, simultaneous bilinguals with SLI have significantly reduced skills in both languages spoken by their primary care providers that cannot be explained by limited language-learning opportunities.

In contrast to simultaneous bilinguals, early sequential bilinguals acquire a single language from birth, and begin the systematic learning of a second language at some point during childhood. Children learning a second language are the fastest growing segment of the global population. In the United States, at least 14% of children learn languages other than English at home (including Spanish, Hmong, Korean, Urdu, Tagalog, and Somali), and begin learning English as their second language when they attend formal educational programs (U.S. Bureau of the Census, 2000). Frequently, the age or order of acquisition of a language is used as a surrogate for determining expected proficiency levels in this population, such that the first language learned is often assumed to be strongest, with skills comparable to monolingual speakers of this language. That is, it is often assumed that the first language learned will always be strongest, and that skills in this first language will be directly comparable to those of monolingual children. However, this is not necessarily the case. A number of recent studies have found that, over time and corresponding language experience, children's performance in their second language may overtake that of their first language. This shift from relatively greater skills in a first language to better performance in the second language is particularly common in young children who learn a minority language at home and the majority language of the community at or before the age of five (e.g., Kan & Kohnert, 2005; Kohnert, 2002; Kohnert & Bates, 2002; Kohnert, Bates, & Hernández, 1999; Leseman, 2000).

The majority of children learning two languages sequentially are typical language learners and, with time and appropriate experience, will become proficient users of the second language while maintaining a comfortable level of proficiency in their first language. However, consistent with the overall prevalence rates of SLI in monolingual English speakers, we can reasonably anticipate that a subset of children learning a second language (approximately 5% to 7%), will have SLI for which timely identification and intervention is needed to ameliorate negative long-term effects. The identification of SLI in children learning two languages is fraught with a number of formidable challenges.

When we compare typical second language learners and monolingual children with SLI on traditional language assessment measures in the second language only, there appears to be considerable overlap between the two groups (e.g., Håkansson & Nettelbladt, 1996; Paradis & Crago 2000; Windsor & Kohnert, 2004). That is, performance by typical second language learners on these language measures is more consistent with that of monolinguals with SLI than with language-intact monolinguals. The documented poorer performance on these traditional language measures by both children with SLI and typical sequential bilinguals, relative to their language-intact monolingual age peers, is explained in very different ways. Children with SLI are considered to have less efficient language-learning systems, that is, a deficit internal to the child. In contrast, most children who are developing two languages sequentially have intact language-processing systems, but may perform poorly on traditional language tasks relative to monolingual age peers because of differences external to the child. Different language-specific experiences often mean that children who, for example, learned Spanish as their first language and began learning English as their second language in early childhood may have had fewer opportunities to learn or use the language being tested (Windsor & Kohnert, 2004).

In addition, children's knowledge may be distributed across their two languages in ways that are not readily comparable to individuals who speak a single language (e.g., Kan & Kohnert, 2005; Peña, Bedore, & Zlatic-Giunta, 2002). Distributed (as opposed to duplicated) skills mean that the same information is not necessarily encoded in both languages. There may be some concepts that are present in both languages, and other concepts that are present only in one. This is particularly evident in the area of productive vocabulary. Related to this notion of distributed skills is the finding that the dominant or strongest language may not be the same for all language measures. Rather, it seems that the child's best language may vary as a function of tasks, modalities or topics (e.g., Bialystok, 2001; Kohnert & Bates, 2002; Snow, 1990). In these cases, single-language skill assessments will underestimate the developing bilingual child's composite language system. Thus, exclusive use of traditional language assessment measures in the second language do not provide the diagnostic information needed to separate normal differences in the face of diverse language experiences from language impairments internal to the child.

In order to adequately identify (or rule out) the presence of a SLI in developing bilinguals, clinical experts recommend that assessments be undertaken in the first language as well as in the second language. However, this recommendation presents three additional interrelated challenges. First, there are no measures available in the home language for many children (including those who speak Hmong, Somali, Tagalog, or Urdu) and few trained professionals who could administer or interpret the results of such measures should they be created. Second, sequential language learning by children involves complex interactions between the first language, the second language, the developing child, and his or her experiences. Separate, single-language assessments in either the first or the second language may underestimate the skills of immigrant children at certain stages of the language acquisition process when comparing performance to monolingual normative data (Kan & Kohnert, 2005; Kohnert, 2007; Schiff-Meyers, 1992). The third overriding challenge to clinical language-based assessment in both languages of developing bilinguals is the fundamental lack of information regarding what is considered typical progress relative to the age and experiences of the developing child. For example, how many words in English should a six-year-old Spanish-speaking boy comprehend after two years of systematic English experience? How should this child perform when asked to follow complex spoken instructions in either Spanish or English? Does this vary from what we would expect of a six-year-old Spanish-speaking child who has four years of systematic English experience? What is the normal range for language behavior in sequential bilinguals, and when should we be worried about possible disorders?

A direct result of this lack of basic-level normative data is that children learning two languages sequentially are alternately overrepresented and underrepresented in language remediation and special education programs in the United States and abroad (Argulewicz & Sanchez, 1983; Roseberry-McKibbin & Eicholtz, 1994; Winter, 1999). The overrepresentation results from classifying language differences as language impairments. This frequently occurs when language performance in sequential bilinguals is compared to that of monolinguals. The underrepresentation occurs when all observed language deficits are attributed to the "bilingual background" of the child. In summary, we still do not have the information necessary to identify a breakdown in the language acquisition process in children learning a second language when it occurs.

SLI and Typically Developing Bilinguals: Points of Divergence

As discussed previously, numerous studies have found that monolingual children with SLI perform more poorly on nonlinguistic cognitive processing tasks. From a general cognitive-linguistic

information processing perspective, these findings in the SLI literature may provide a new foothold from which to explore the joint study of developmental SLI and typical second- or dual-language learning by children. In particular, comparisons on more general nonlinguistic information processing tasks, in addition to language-based comparisons, may be useful in identifying similarities between language-intact monolinguals and developing bilinguals, which differentiate them from children within each language group with SLI. That is, there may be nonlinguistic processing differences between children with SLI that hold across linguistically diverse groups. If the presence and stability of this common cognitive processing ground could be shown across diverse linguistic groups, it may be possible to develop methods to exploit these areas to determine language differences (normal skills in the face of diverse experiences) from language disorders (central language processing deficits). In addition, such investigations would provide a unique perspective into the relationship between basic cognitive processing mechanisms and language in linguistically diverse children with and without SLI. The fundamental question is, are the subtle differences in general nonlinguistic cognitive processing mechanisms observed in SLI causally related to the language impairment, thus providing a unique window into the mind-language relationship? Can performance on nonlinguistic information processing tasks be used to separate children with SLI from their typically developing peers who are in the process of learning a second language?

In a recent study, we investigated nonlinguistic performance in linguistically diverse children, 8 to 13 years old (Kohnert & Windsor, 2004). The primary question of interest was whether response speed on auditory and/or visual detection tasks would be sensitive to group differences between typically developing monolingual and bilingual language learners, as compared to monolingual children with SLI. On the Choice Auditory Detection task, children were instructed to push one button in response to a high-pitched pure tone of brief duration, and a different button in response to a low-pitched tone. On the Choice Visual Detection task, children pushed one button in response to a red shape, and a different button in response to a blue shape. This task was very easy for all participants; therefore performance accuracy was very high. The dependent variable of interest was response speed. Overall, results from these tasks provided clear evidence for differences in response speed between intact and impaired language learners, at some level, independent of the number of languages spoken. The task producing the most robust between-group differences was Choice Visual Detection. On this task, there were significant differences between the SLI and bilingual groups, as well as between the SLI and typically developing monolingual English groups. That is, both groups of typically developing children (monolingual and bilingual groups) were faster than the monolingual groups of children with SLI (Kohnert & Windsor, 2004).

In summary, the quantitative differences found here suggest that subtle inefficiencies in basic nonlinguistic information processing play a fundamental role in the performance profile of SLI. There remain a number of challenges that need to be met in order to translate these study findings into the clinical setting. For example, it will be important to determine if and how group performance documented in this first series of studies can be used to qualify performance at the individual level, and if methods used in the experimental setting can be exploited for clinical use. Also, it will be important for future studies to include a broader skill range in both the intact and impaired groups to determine a range of typical performance and critical cutoffs, should they exist. Despite these significant challenges, results from the nonlinguistic processing study with linguistically diverse learners point us in a new direction for the development of nonbiased assessment, and possibly intervention, techniques. This is one of the greatest areas of practical need, as clinicians are faced with the challenges of accurately separating differences from disorders in an increasingly diverse population (Kohnert, Kennedy, Glaze, Kan, & Carney, 2003). Of equal importance, results from these studies

provide empirical data needed to develop models that link typical and atypical first- and second-language learning in children within the same comprehensive theoretical framework. In the following section we address another important question at the intersection of bilingualism and SLI. Specifically is it advisable, or even possible, for children with SLI to learn two languages?

Are Children with SLI Capable of Learning Two Languages?

For children with SLI, timely, effective intervention is needed to ameliorate the potential negative effects of the language impairment and maximize academic and social achievement. For developing bilinguals, a first step in developing an effective intervention plan is to determine which language or languages should be supported through intervention. This is not a clinical decision that applies to children from monolingual families that share the dominant language of the community, yet it is the most basic clinical decision to be made with linguistically diverse learners. The response to this question hinges on the more basic theoretical question—can children with SLI acquire two languages?

A common belief among many professionals is that bilingual children with SLI are at a distinct long-term disadvantage, as compared to monolingual children with SLI. The reasoning is that if one language is hard for the child (as is clearly the case for children with language impairments), two languages will be harder and exceed his or her language learning capacities. The logical recommendation is to consolidate resources by scaling back to a single language. A monolingual approach to intervention for bilingual children with SLI is believed by many to improve the child's chances for success.

The hypothesis that dual-language input has disproportionate negative consequences for children with SLI has received little direct empirical attention. An important exception is a study by Paradis, Crago, Genesee, and Rice (2003). Paradis et al. found that seven-year-old Canadian children with SLI who received consistent input in two languages from birth (French and English, in this case) did not fare worse than their monolingual peers with SLI. That is, both monolingual children with SLI and bilingual children with SLI were affected to the same degree, as measured by performance on spontaneous language samples. Children in this study were simultaneous bilinguals who received consistent input from birth in both French and English. Results from this study are significant in that they illustrate the capacity of children with SLI to learn two languages, at least to a similar level as their monolingual peers with SLI.

Another type of evidence that speaks to this question is the results of training studies in either one or two languages. Thordardittir, Ellis Weismer, and Smith (1997) used a single-case alternating treatments design to compare the effectiveness of bilingual and English-only conditions in working with a four-year-old boy with SLI. This child's first language was Icelandic; his second language was English. As expected, intervention in the English-only condition resulted in gains only in English vocabulary. The bilingual condition resulted in gains in both Icelandic and English. Gains in English, the majority language, were comparable across the two conditions. These findings suggest that, at the very least, increasing skills in a child's home language does not jeopardize learning of the majority language, even for young children with SLI. Gutierrez-Clellen (1999) also argues that children with SLI require comprehensible input, above and beyond what is needed by the typically developing child. Gutierrez-Clellen argues that for the child who functions in environments in which two languages are used, comprehensible input, by definition, requires continuous experience in two languages.

In summary, the admittedly limited research to date suggests that children with SLI are capable of learning two languages, at least to the same level as their monolingual peers with SLI. Perhaps more importantly, when two languages are needed for a child's long-term social, emotional, cognitive, academic, and vocational success, bilingual intervention is needed (Kohnert, Yim, Nett, Kan, & Duran, 2005; see Kohnert 2007 and Kohnert & Derr, 2004 for additional discussion). In the following section we turn our attention to primary acquired language impairments in the adult population.

Acquired Aphasia in Monolingual Adults

Aphasia is classically defined as impairment, resulting from brain damage, in the ability to decode or encode conventional linguistic elements for the purposes of speaking, listening, reading, or writing (Darley, 1982). It is estimated that one in every 250 people in the United States has an acquired aphasia (National Aphasia Association, 2004). One of the most common causes of aphasia is a cerebral vascular accident (CVA) in the primary language centers of the brain. As its name implies, a CVA, or stroke, is an interruption in normal blood flow to the brain. A CVA can strike at any age, but the risk of stroke increases across the lifespan. Approximately 70% of strokes occur in individuals age 65 or older (Bonita, 1992). Focal damage from gunshot wounds, tumors, or aneurysms may also result in aphasia. The parts of the brain affected in aphasia are those that have primary responsibility for processing language content (words and meanings) and form (rules that govern the combination of linguistic units, including grammar). In contrast to individuals who suffer bilateral frontal lobe damage from more widespread brain trauma, pragmatics (the social conventions for language use) is not a primary area of deficit in aphasia.

For the vast majority of both right-handed and left-handed individuals, primary language centers are located in the cortex of the left hemisphere of the brain. The classic language centers include Broca's area, located in the front, or anterior portion of the left hemisphere, Wernicke's area, located in the posterior hemisphere, and the connecting fibers that transmit information between these two cortical centers. Therefore, aphasia typically, but not exclusively, results from focal damage to the left hemisphere of the brain, encompassing these classic language centers or adjacent areas. In addition to aphasias resulting from damage to specific areas of the cortex, damage to subcortical areas, including the thalamus or basal ganglia, may also produce aphasia (Kirshner, 1995).

Aphasia is often classified into different types, based on the site of damage and the presenting language characteristics. Classification schemes based on the location of damage typically identify at least seven different aphasia syndromes, including three nonfluent types (Broca's, Transcortical Motor, and Global) and four fluent types (Wernicke's, Anomic, Transcortical Sensory, and Conduction). For current purposes, we take a more general approach and consider two major types of aphasia: nonfluent or receptive aphasias as compared to fluent or expressive aphasias.

Mild to moderate nonfluent aphasias typically result from focal damage to the anterior portions of the left hemisphere. In nonfluent aphasias, the most obvious area of deficit is in the expression or production of language. Expressive language may be slow, halting, and limited in length. Expressive language may be marked by paraphasias, perseverations, anomia, and agrammatism. Paraphasias are errors at the sound or word level. Perseverations refer to the involuntary repetition of words or phrases. Anomia, or difficulty in naming entities, is similar to the "tip of the tongue" phenomenon that most healthy adults experience at some point, in which they are unable to come up with a particular word at the time it is needed. Agrammatism is used to describe shorter,

"telegraphic" (e.g., *John walk store*) sentences that are less grammatically complex. As with SLI in children, the presence or nature of grammatical errors in aphasia is affected by the typology of the particular language. Speakers of languages with rich morphological systems, such as Hebrew or Turkish, will show somewhat different patterns than speakers of English, which has a relatively sparse morphological system. In mild to moderate nonfluent aphasias, the ability to understand language is better than the ability to produce it, although it is also likely affected to some degree. Aphasia is a multimodality disorder affecting the processing or interpretation of symbols. As such, written as well as spoken and signed languages are similarly affected in aphasia.

The left anterior damage associated with nonfluent aphasias often results in motor or movement difficulties. These difficulties include paralysis or weakness of the right arm and leg (if the damage is to the left side of the brain, as is most typical), as well as potential difficulties with either the central programming of the speech muscles (apraxia of speech) or weakness in the speech muscles themselves (dysarthria). As a practical matter, it is often difficult to completely separate the language deficit characteristic of nonfluent aphasia from associated motor speech impairments.

The second major type of aphasia is called fluent or receptive aphasia. Mild to moderate receptive or fluent aphasias typically result from focal damage to posterior portions of the left hemisphere. In receptive or fluent aphasias, the ability to understand linguistic symbols is significantly impaired. The individual with receptive aphasia will have difficulty understanding both spoken and written language. Although expressive language is in no way spared, fluent aphasias derive their name from the seemingly effortless flow of spontaneous speech that they sometimes produce. This speech is produced following the rhythmic flow of the native language, with few pauses or breaks. A close listen to the content of this speech, however, reveals that it has little meaning. Because of this lack of content or meaning, the speech produced by individuals with nonfluent forms of aphasia is referred to as jargon. This jargon often includes neologisms, or invented words that have no meaning (such as *fefa* instead of chair) as well as semantic paraphasias, in which the individual chooses a real word, but one that conveys the wrong meaning (referring to a daughter as *mother* or to home as the *hospital*). Often in fluent aphasias, the individual is not aware of these errors because of the marked difficulties in comprehension. That is, when the understanding of language is impaired, it follows that the ability to monitor and correct one's speech will suffer as well.

It is common for individuals to have a mixed expressive-receptive aphasia. In mixed aphasia, there is difficulty in both producing and comprehending language. The degree of difficulty or severity of aphasia can range from mild to profound. Individuals with mild aphasia may be able to carry on normal conversations in many communication settings. They may have trouble understanding language only when it is long or complex. The anomia, or word-finding problems, are likely one of the major persistent symptoms. In contrast to mild aphasia, the deficits observed in global aphasia are profound, in all language domains. The person with global aphasia is nonfluent, unable to consistently produce words, gestures, or written symbols. Language comprehension is similarly affected. In many cases, the severity of aphasia is somewhere between these two extremes. Individuals with moderate or severe aphasia have varying degrees of difficulty in producing or understanding words, sentences, or discourse in either spoken or written form.

Functional deficits are typically most severe immediately following the acute onset of damage to the brain. Within days of the initial neurological event, the body's natural recovery process begins. As swelling is reduced, some cells that were injured but not permanently damaged, may recover and there may be some reorganization of neural functioning. The course and extent of this spontaneous recovery process are difficult to predict, but the rate of improvement is generally

faster during the first few weeks, continuing for several months then gradually ceasing around six months after the brain injury. In treatment efficacy studies, spontaneous recovery must be strictly controlled if a case is to be made that a specific type of intervention helps the individual recover functioning to a level greater than what would be anticipated due to spontaneous recovery alone. However, in clinical practice, it is unethical to withhold treatment during this period of natural healing. Indeed, cognitive-linguistic and physical treatments, such as those administered by speech-language pathologists, occupational therapists, or physical therapists, are undertaken as soon as the person's medical condition is sufficiently stable. For example, in the first few days following a stroke the physical therapist may begin to assist the individual with walking and other gross motor skills; the hospital-based speech-language pathologist may be called on to assess language and speech, as well as to provide family members with information on communication following a stroke. The goal is to take advantage of this natural healing period, to help the individual recover the greatest degree of functional skills possible, as quickly as possible. The following description is fairly typical of the onset and aftermath of aphasia resulting from a single unilateral left hemisphere CVA:

> Leo is a relatively healthy 65 year-old monolingual English-speaking college professor at a major university in the United States. After a busy Sunday, Leo retires early for the night, complaining of a severe headache. In the morning his wife has difficulty waking him, and then notices that his speech is slurred, he does not seem to understand her, and he is unable to move his right arm or leg. An ambulance is called. Although approximately one third of the 700,000 individuals in the United States who suffer a stroke each year die shortly thereafter, Leo does not. He remains in acute care for only a few days, demonstrating increased responsiveness to his environment with each passing day. Within a week after the onset of symptoms, his medical condition stabilizes. Functionally, he is entering a period of spontaneous recovery in which there are noticeable improvements in his communication and motor skills. Leo is transferred to a rehabilitation facility specializing in working with adults with different types of brain injury. He participates in several weeks of intensive rehabilitation administered by an interdisciplinary team of professionals, including a speech-language pathologist, a physical therapist, an occupational therapist and a neurologist. Assessments are also conducted by a psychologist. A medical social worker is available to assist the family in planning for Leo's return home. At the time Leo is discharged from this intensive in-patient treatment, he is able to ambulate using a four-pronged cane, he has begun to write words with his left hand (prior to the CVA he was right handed) and he is able to understand and produce short phrases. He returns to live at home with his wife. Leo receives out-patient individual language and mobility intervention two times per week for another three months, and attends an on-going community-based support group for stroke survivors. Approximately one year after the CVA, Leo is able to read the newspaper and to fully participate in informal conversations. He understands most of what he hears although he continues to have difficulty formulating language, in both spoken and written forms. He is unable to return to his teaching and research duties, although he does meet with colleagues on a regular basis for social activities. He plans on seeking additional language treatment through the on-campus graduate student training clinic at his former university.

Aphasia in Bilingual Adults

Relative Type and Severity of Cross-Linguistic Impairment

As noted previously, the primary processing centers for language content and form are lateralized to the left hemisphere for most (but not all) monolingual adults. Damage to these areas has a negative impact on the expression and/or comprehension of language. This is also true for proficient bilingual adults. That is, for the vast majority of proficient bilingual speakers, both languages are lateralized to the left hemisphere (Paradis, 2000). Therefore, damage to the language dominant hemisphere (which is typically the left) will cause aphasia in bilingual individuals, just as it does in monolinguals. Given that both languages of the proficient bilingual are processed in the same hemisphere of the brain, we can reasonably anticipate that both of these languages will be affected to some extent in the vast majority of bilinguals with acquired aphasia. However, it is also important to ask if both languages are affected in the same way or to the same degree. That is, will the same general type of aphasia be present in both languages? Is it possible that skills in one language will be affected more than those in another language?

Despite initial rumblings to the contrary (e.g., Albert & Obler, 1978), the weight of evidence currently available clearly indicates that in bilingual aphasia, the same general typological classification holds across both languages (Paradis, 1998). That is, if an individual has a nonfluent aphasia in one language, the impairment in his other language will also be nonfluent, with similar characteristics. It is likely, however, that the characteristics of different languages affect the most observable symptoms. For example, agrammatism may look quite different in a language that requires grammatical markings for case, gender, or tense as compared to languages that rely on lexical or contextual cues to convey this information. In English, for example, the individual may omit verb endings indicating tense, such as *s* or *ed*. However, in highly inflected languages, such as Spanish or Italian, where verb conjugations are more frequent and carry greater semantic importance, verb tense omissions may not be apparent, despite the reduced overall efficiency in language expression. That is, what at first blush may appear to be distinct types of aphasias may reflect the underlying deficit following brain damage interacting with the characteristics of a particular language (see Paradis, 1998).

Although the general type of aphasia is similar in both languages, the question remains as to whether the level of severity of impairment is also similar between these two languages. The potential for differing levels of deficit in the languages of a bilingual adult following brain damage has been a persistent theme in the bilingual aphasia literature. This issue is most consistently referred to as *differential recovery*. Paradis (1977) proposed five basic patterns of relative cross-linguistic recovery in bilingual and multilingual individuals with aphasia. These classic types of recovery patterns are: (a) parallel recovery (both languages recovered in proportion to their relative pre-morbid proficiency levels; (b) differential recovery (one language is recovered to a greater degree than the other); (c) selective recovery (one language remains inaccessible to the individual, at least for production); (d) successive recovery (rapid improvement in one language is followed by similar improvement in the other); and (e) antagonistic recovery (skills in one language regress as skills in the other language improve) (Paradis, 1998). Importantly, these patterns of recovery are not mutually exclusive, and they may change over time. The pattern that has received the most empirical support is parallel recovery. Consider the following case of parallel recovery in bilingual aphasia:

> Ricardo is a 58-year-old engineer. Following a single CVA to the left anterior hemisphere, he had a moderate to severe nonfluent aphasia. Prior to the aphasia, he was very proficient in Portuguese and English and used both languages on a regular basis. Portuguese was his first language; English was his second language. Ricardo immigrated to the United States from Brazil approximately 30 years prior to the CVA, at age 28. He had earned advanced degrees in both Portuguese and English. He spoke primarily Portuguese with his wife and English with his children, colleagues and in most social settings. He was an avid reader in both languages. His language skills were assessed in both Portuguese and English approximately three weeks after the CVA. Each language was assessed separately, using comparable measures. Performance for both language comprehension and production were similar in the two languages. For example, Ricardo identified 90% of pictured items in Portuguese and 85% of pictured items in English, and he responded to simple yes/no questions with 80% accuracy in each language. Language production skills were more impaired than comprehension in both languages. Ricardo named only 20% of pictured items in Portuguese and 25% in English. Conversational speech was limited to a few words, sometimes in Portuguese (even with monolingual speakers of English); sometimes in English, and sometimes mixing the two languages.

Although the similarity in the relative degree of impairment shown here for Ricardo is common, this particular pattern of *parallel recovery* (perhaps more accurately termed *proportional impairment*) does not hold for all bilinguals with acquired aphasias. Fabbro (2001) investigated language recovery of 20 bilingual Friulian-Italian individuals with aphasia. Friulian was the first language for most participants, with Italian learned as a second language in childhood. The study was conducted in Italy, and Italian was the primary language of the majority community and educational system. Thirteen (65%) of these individuals showed a similar impairment in both languages; seven (35%) showed differential impairment. Of these seven individuals who showed differential impairment in their two languages, four showed greater impairment in the second language, while three participants showed greater impairment in their first language. At the group level, Junqué, Vendrell, Vendrell-Brucet, and Tobeña (1989) also reported evidence of differential impairment and recovery in a group of Catalan-Spanish bilinguals with aphasia, on two of three tasks. All participants lived in Spain, but learned Catalan as a first language and Spanish as a second language in early childhood. Participants in these studies were tested one to six months following brain injury.

These reports of differential recovery in relatively large group studies are important complements to previous reports of individual cases of differential recovery. However, these reports must be considered in light of additional factors, including the amount of time that has elapsed since aphasia onset and the types of tasks used to measure skill in each language. In addition, it is important to consider true levels of pre-morbid proficiency in each language, rather than those that are assumed based on age or order of acquisition. As we have seen, it is not at all uncommon for a shift from relative dominance in a first language to greater strength in a second language for bilingual children, particularly when this second language is used in the educational system. Thus, poorer performance in the first language after a stroke does not provide clear evidence that this language has suffered a disproportionate effect. What can be said is that there may be significant variation in the relative level of skills in each language in bilinguals with aphasia. Because skill level in each language can vary, it is important that a full assessment of skills be conducted in each

language. In the following section we turn our attention to potential links between language and cognitive skills in bilingual aphasia.

Bilingualism and Cognition in Aphasia

Aphasia is defined as a primary acquired disorder in language. However, it is not necessarily the case that language is the sole domain of impairment. From a cognitive perspective, aphasia is considered the result of reduced efficiency in the general cognitive processes believed to support language behavior, caused by organic damage to the brain (Chapey, 2001; Luria, 1966; Martin, 1981). These cognitive processes may include attention, perception, pattern recognition, categorization, problem solving, and memory. This cognitive view of aphasia is similar to the cognitive view of SLI introduced previously. Findings from a number of recent studies with monolingual adults with aphasia reinforce the notion of aphasia as a primary, but not exclusive, language deficit (see Kohnert, 2004b; Kohnert, 2007). Basic cognitive mechanisms may play an additional role in bilingual language processing. Proficient, neurologically intact bilinguals can speak exclusively in one language or the other, or alternate between the two languages, as when code-switching with other bilingual speakers. In contrast to natural conversational code-switching, a number of studies have used forced language-switching tasks in an effort to investigate cognitive control of bilinguals' dual language system (e.g., Dehaene, 1999; Green, 1998; Price, Green, & von Studnitz, 1999). Results from cued switching production tasks indicate that the ability to resist interference from the nontarget language increases throughout childhood, remains stable during middle adulthood, and declines after age 65 (Hernandez & Kohnert, 1999; Kohnert et al., 1999; Kohnert, 2002). It is important to note that increased cognitive demands do not appear to be present in comprehension tasks that require a language shift (Kohnert & Bates, 2002). A cognitive perspective directs us to ask if and how will a weakness in basic underlying cognitive mechanisms affect the processing and cross-linguistic control of two languages?

Evidence of weakness in the cognitive control of two languages includes language mixing or "wrong" language use during production. A number of researchers have documented this behavior in bilingual aphasia (e.g., Fabbro, 1999; 2000; Fabbro, Skrapp, & Aglioti, 2000; Kohnert, 2004b). In what is sometimes called "pathological" language mixing, the bilingual individual spontaneously and unintentionally switches between languages, often with a monolingual speaker during conversational exchanges. He or she may become visibly frustrated by this inadvertent language switch (Fabbro, 1999). This pathological language mixing is very different from the pragmatically appropriate intentional code-switching observed in bilinguals with and without aphasia (Muñoz, Marquardt, & Copeland, 1999) and is consistent with inefficiencies in the general cognitive control system.

Kohnert has observed this weakness in cross-linguistic control in the clinical setting in both fluent and nonfluent aphasia. As an example, one 76-year-old man had a moderate to severe fluent aphasia following a CVA to the posterior left hemisphere. He was proficient in German, French, and English. He was born in Germany, lived in France for many years, and then moved to the United States. Prior to the CVA he and his wife of 50 years spoke French at home (although his wife also spoke English, but no German), English in his community, and German only rarely during telephone calls to family. Frequently over the next several weeks of assessment and intervention, he would switch to German with the clinician who did not speak that language. He had difficulty monitoring this switch because of his poor comprehension skills. His wife also reported

that he often spoke with her in a mixture of German and English, which caused her a great deal of frustration.

Unintentional language mixing or switching may also be present in nonfluent aphasias. An example of unintentional code-mixing between English and Spanish in nonfluent bilingual aphasia follows:

> **Examiner:** Tell me what you see in this picture.
> **Client:** Pencil … no … person … father … father … nena [*baby*] . . . no se [*I don't know*]
> **Examiner:** What is this?
> **Client:** Es un hombre [*It's a man*]. (Sigh) … I'm sorry … no puedo [*I can't*]
> **Examiner:** Where do you think he works?
> **Client:** No se [*I don't know*] … un mecánico [*a mechanic*] … no … bueno [*well*] … un [*a*] physician.
> **Examiner:** (Directing attention to new picture) Tell me what you see here.
> **Client:** Y caballo [*and horse*]… el cabazo viene [*the "cabazo"* (paraphasia) *comes*] … el perro viene [*the dog comes*] … ay … el dog is coming

Green (1998) proposes that a bilingual must actively inhibit the functioning of an on-going language schema in order to switch from one language to the other language. In order to achieve this language switch, cognitive mechanisms external to the bilingual lexical system are required to suppress output in one language, while alternately activating the other language. When these general cognitive systems are weakened due to damage to the brain, *cross-talk* between the bilinguals may occur. Classic patterns of language recovery in bilingual aphasia identified by Paradis (1977) may also reflect, at least in part, interactions between general cognitive processing mechanisms and the dual-language system in bilinguals. This is particularly true in cases of so-called *antagonistic recovery*, in which one language appears to improve, and then regresses as the other language improves (cf. Green, 1998). On a clinical note, the mixing of two languages should not be discouraged, particularly in individuals with nonfluent aphasias. Rather, any and all attempts at expressive language should be encouraged and listened to for their communicative intent, rather than the form in which they are expressed.

Another important question that relates to the relationship between bilingual aphasia and cognition is does improvement in basic cognitive processing skills generalize to improved performance in both languages of the bilingual? In a recent single case study, Kohnert, 2004b (Study 1), investigated potential generalization across cognitive-linguistic domains with D.J., a 62-year-old bilingual man with severe nonfluent aphasia. Spanish was D.J.'s native language and English was his second language. He was reportedly very proficient in both languages, earning advanced medical degrees in English as well as Spanish. D.J. immigrated to the United States from South America at age 35 and had resided continuously in the United States for more than 25 years. During this time English was the language used in his professional and social settings; both Spanish and English were used at home with his wife and children.

D.J. suffered a single embolic CVA to the middle left cerebral artery of the left hemisphere approximately one year prior to the beginning of the treatment described here. D.J. had right-sided limb weakness and ambulated with a cane. His language symptoms were consistent with severe transcortical motor aphasia, a nonfluent aphasia, in which repetition is relatively preserved, despite marked deficits in naming and expressive language (Davis, 2000). Spontaneous productions were

limited to infrequent one- to three-word utterances, more in Spanish than English. The focus of this first treatment was on nonverbal skill performance. Specific training activities included card-sorting tasks to target perception and categorization skills, written single-digit math computations, visual number and letter searches to facilitate sustained and alternating attention, as well as several tasks from the high-level attention module from the computer-based training program by Scarry-Larkin (1999). Levels of assistance and/or task difficulty varied as a function of client performance. As this cognitive-based treatment was designed to emphasize nonlinguistic information processing, no specific language training was provided.

Following this nonlinguistic cognitive treatment, performance on all trained nonlinguistic processing tasks improved. D.J. was both faster and more accurate in completing categorization, visual scanning, and simple written arithmetic problems following treatment as compared to his pretreatment performance on these same tasks. These results demonstrate learning and, consistent with reports in the monolingual literature, indicate that reinforcing basic information processing skills may be an important initial step in effectively treating the more obvious language deficits in individuals with severe nonfluent aphasia (cf. Helm-Estabrooks, 1998; Van Mourik, Verschaeve, Boon, Paquin, & Van Harkskamp, 1992). For current purposes, what were most important were posttreatment improvements in language. Specifically, although no direct training in language was provided, gains in Spanish and English were also evident following this cognitive-based treatment. In Spanish, improvement was observed on four of five language measures administered immediately before and after treatment. In English, there were gains on all five language measures. These differences in performance for both Spanish and English following cognitive intervention are particularly noteworthy given that the treatment reported here began one year after D.J.'s stroke—well beyond the spontaneous recovery period for single embolic CVAs. Consistent with cognitive views of aphasia, gains in Spanish and English may reflect the generalization of skill in information processing from the nonlinguistic to linguistic domain. Future studies are needed to confirm and expand the ways that connections between cognition and language may be used to facilitate functional gains in both languages of the bilingual individual with aphasia.

Connections between Languages in Bilingual Aphasia

In addition to looking at the relationship between cognition and language in bilingual aphasia, we may also consider potential connections between the two languages. For example, in proficient, neurologically intact bilingual adults, the two lexicons may be both functionally and neurologically interconnected (cf. Dijkstra, Grainger, & van Heuven, 1999). This leads us to ask, are premorbid links between the two languages of proficient bilinguals preserved in aphasia? If this is the case, is it possible that treatment gains in one language will transfer to the other? If so, under what conditions will this most readily occur?

A handful of studies have investigated this question, with some discrepant findings. Junqué and colleagues (1989) investigated the potential for generalization from one language to the other following treatment in 30 Catalan-Spanish bilinguals with aphasia. Both nonfluent and fluent aphasias, ranging from mild to severe, were included in this sample. The amount of time since the onset of acquired aphasia for participants ranged from one to six months. For all participants Catalan was the first language learned, with systematic instruction beginning in Spanish (the primary language of both community and educational settings) beginning at about age five. Assessment was conducted in both languages before and after language intervention.

Treatment was provided only in Catalan. Results indicated that performance between pre-and posttreatment testing improved for both languages (although gains were greater for Catalan). Authors concluded that these results provided evidence of cross-linguistic generalization in that treatment in one language improved performance in a nontreated language. Fredman (1975) reached a similar conclusion after studying a group of bilingual individuals with aphasia. However, the critical control of time post-injury was not considered in these studies. Therefore, observed gains in the untreated language could also be attributed to a natural process of recovery rather than to direct links between the two languages. Watamori and Sasanuma (1978) studied the effects of treatment in two English-Japanese bilinguals with aphasia in an alternating treatment design and found that gains were more restricted to the treated language.

A handful of studies have investigated the relationship between two languages in aphasia at the lexical-semantic or word level, by using a particular type of stimuli-cross-linguistic cognates. For languages that are historically linked, there exist cross-linguistic cognates or word pairs that overlap in form as well as meaning, such as Spanish *teléfono* and its English translation *telephone*. Faster or more accurate responses to cognates relative to non-cognates (*table*/*mesa*) on word reading, lexical decision, and translation tasks are consistent findings with neurologically intact adult bilinguals. Roberts and Deslauriers (1999) tested confrontation naming of cognate and non-cognate words by French-English bilinguals with and without aphasia. One of the most persistent areas of impairment following acquired brain damage is in lexical access and production, as measured during confrontation naming—that is, when individuals are asked to produce the name of pictured or real items. These researchers found that bilinguals with aphasia were able to correctly name more pictures of cognates than non-cognates, in both French and English.

In another study, Lalor and Kirsner (2001) investigated the speed and accuracy of word recognition on cognates relative to non-cognates during word reading and lexical decision tasks in a 63-year-old multilingual man with mixed aphasia. In lexical decision tasks participants listen to or read strings of sounds/letters and determine if they are real or invented words. This multilingual participant with aphasia was more accurate in making lexical decisions for cognates relative to non-cognates in Italian and English. For word reading, there was a greater advantage for low-frequency cognates in Italian (the relatively weaker language, post-morbidly) that had high-frequency English translations. This indicated facilitation from the stronger to weaker language. A key finding from these studies is that they provide evidence for preserved cross-linguistic connections, at least at the interface between word form and meaning, in bilingual individuals with aphasia. We might then reasonably ask if these preserved cross-linguistic connections can be exploited to facilitate the transfer of treatment gains from one language to another in treatment for bilingual aphasia?

To address this question, D.J., the Spanish-English bilingual gentleman described in the previous section, participated in a second treatment study (Kohnert, 2005, Study 2). The goal of this study was to determine if there would be generalization from trained to untrained items for cognates and non-cognates within each language, and to determine if these gains would transfer across languages for both word types. Percent of items named correctly on a confrontation-naming task before and after each language treatment was used to index change. Consistent with Lalor and Kirsner (2001) and Roberts and Deslauriers (1999), pretreatment performance in Spanish was slightly better for cognates (40%) than non-cognates (20%). Following Spanish intervention, performance improved substantially for both word types, with 80% of cognates and 70% of non-cognates named. That is, there was generalization from trained to untrained test items for both types of words. However, the generalization of gains across languages, from

Spanish to English, was apparent only for the cognate stimuli. Specifically, cognate naming following Spanish treatment was 80%. Following a one-week interval, naming of these same stimulus pictures in English was 70%. In contrast, for non-cognates naming fell from 70% to 10% in the shift from Spanish to English.

These results suggest that by selecting stimuli that have elements common to both of the bilingual's languages we may be able to maximize initial treatment gains. At the same time, results suggest that there may be constraints on the generalization of intervention gains across languages. In contrast to studies that noted a general transfer of treatment gains from the treated language to an untreated language (e.g., Junqué et al., 1989), cross-linguistic generalization was observed here only for cognate stimuli. Future investigations are needed to more precisely define the parameters of generalization from one language to another, in terms of both possibilities and limitations.

Summary and Conclusion

In this chapter we have focused on the intersection of bilingualism and primary language impairments in children and adults. Primary language impairments are deficits or inefficiencies in the comprehension and/or production of spoken or written language. The underlying deficit that affects language processing is evident in each language of bilingual children and adults. Just as with typical bilinguals, however, the relative degree of cross-linguistic proficiency may vary in bilinguals with language impairments. That is, both languages may be equally affected, or one language may be relatively weaker than the other. For children, differences in cross-linguistic skill may be due to different opportunities to develop and use each language. For adults with acquired language impairment, differences in cross-linguistic skill may be related to pre-morbid levels of proficiency in each language or a direct result of the injury. For bilinguals with suspected or confirmed impairments in communication, both languages must be systematically considered in assessment and intervention activities.

The two major types of language impairment considered here were specific language impairment (SLI) in children and aphasia in adults. SLI is defined as a developmental disorder, affecting the acquisition and use of language. In SLI, delays or deficits in expressive and/or receptive language are not explained by sensory impairment, low nonverbal intelligence, frank neurological disorders, or environmental deprivation. The most salient symptoms of SLI change as a function of the developing child, shifting environmental demands, and specific characteristics of the language(s) to be learned. Delays in language are determined based on comparisons to age peers with similar language and cultural experiences.

It is difficult to identify SLI in developing bilinguals. Children learning two languages are an extraordinarily heterogeneous group, in terms of the combination of languages learned, the children's ages at which systematic experience with the different languages begins, as well as the contexts in which this language experience occurs. This heterogeneity significantly complicates the development of normative data that can be used to reference typical language skills in developing bilinguals, as distinct from that of children with SLI. As a result, children learning two languages are both under-and over-identified as SLI. Future investigations into alternative assessment approaches for linguistically diverse children are needed to help resolve this issue. One promising area is to investigate the integrity of children's basic information processing system outside of the language domain. That is, although the obvious delays in language cannot be explained by frank cognitive or neurological impairment, children with SLI are hypothesized to have some subtle inefficiency in the general cognitive processing mechanisms that challenge the

efficient acquisition and use of the specific language codes present in their environments. Tasks that measure the speed or efficiency with which basic nonlinguistic information is processed are much less dependent on specific cultural and language experiences and therefore potentially less biased. Results from recent studies suggest that performance on selected nonlinguistic information processing tasks may be useful in separating typically developing bilingual children from children with SLI (Kohnert & Windsor, 2004; Windsor & Kohnert, 2004).

The second type of primary language impairment presented in this chapter was acquired aphasia in adults. Aphasia is a multimodality deficit in language resulting from acquired brain damage. The parts of the brain affected in aphasia are those that have primary responsibility for processing language content and form. For the vast majority of both right-handed and left-handed monolinguals and bilinguals, primary language centers are located in the cortex of the left hemisphere of the brain. Major aphasia types are nonfluent or expressive aphasia, fluent or receptive aphasia, and mixed receptive-expressive aphasia. The location and extent of damage are closely related to the aphasia symptoms and their severity. Functional deficits are typically most severe immediately following the acute onset of damage to the brain, followed by several months of natural healing in which there is some improved functioning. The remaining spoken and written deficits are consistent with chronic aphasia. As with SLI, subtle inefficiencies in basic cognitive processing are also present in aphasia.

For bilinguals, the general type of aphasia is apparent in both languages, although the relative degree of cross-linguistic impairment may vary. A number of different patterns of relative degree of impairment have been documented. Chronic aphasia typically affects both languages. The cognitive control of the dual languages may also be weakened, as evidenced by the unintentional switching between languages or producing the "wrong" language when interacting with monolinguals (Kohnert, 2007). This evidence of weakened skills in basic cognitive skills indicates that, in some cases, attention to basic nonlinguistic information processing may be a useful preliminary step in clinical interventions designed to facilitate gains in both languages of the bilingual with aphasia. It is also the case that some cross-linguistic links may be preserved in bilingual aphasia. Future research is needed to clearly define what skills may generalize from one language to the other following intervention, and which language skills will need to be treated separately in each language. In addition to the clear practical needs of research with bilinguals with language impairments, such research can also help to broaden our understanding of the fundamental relationships between languages and cognition, as well as between two languages within the same brain.

List of Key Words and Concepts

Aphasia, Cerebral vascular accident (CVA), Cross-linguistic cognates, Developmental disorders, Differential recovery, Primary language impairment, Sequential bilingualism, Simultaneous bilingualism, Specific language impairment (SLI)

Internet Sites Related to Primary Language Impairments

American Speech, Language and Hearing Association (ASHA): http://www.asha.org/index.cfm:

Information on causes and treatment of stroke with available low-cost materials: http://www.stroke.org/

Learning Disabilities On-Line for parents, teachers and other professionals: http://www.ldonline.org/

National Aphasia Association: http://www.aphasia.org

National Institute of Neurological Disorders and Stroke Web site: http://www.ninds.nih.gov/healinfo/nindspub.htm

University of Birmingham School of Education Bilingual Database (Royal College of Speech & Language Therapists): http://www.edu.bham.ac.uk/bilingualism/default.htm

Discussion Questions

1. Language impairments are determined relative to "normal" or typical performance by individuals of the same age, who share similar language, cultural, and educational experiences. What are the practical challenges to identifying (or ruling out) a primary language impairment in a nine-year-old girl living in the United States who learned Vietnamese as her first language, and English as her second language beginning at age five?
2. A relatively common developmental language impairment referred to in the literature is Specific Language Impairment or SLI. Based on the information presented in this chapter, do you feel that the word *specific* provides an accurate description of the cluster of the SLI profile? Why or why not? Does your answer depend on the theoretical perspective from which you consider language development or language disorders?
3. Diego is a four-year-old boy from a Spanish-speaking family living in the United States. He attends a preschool educational program in which all instruction is in English. He was recently diagnosed with severe SLI, affecting both the comprehension and expression of language. The evaluation report recommends that Diego receive language intervention, in English only, to improve his chances at academic achievement in the formal educational system, which uses English as the sole language of instruction. Do you agree with this recommendation? Why or why not? Is it possible for children with SLI to acquire two languages? Do you think bilingual children with SLI are at a greater disadvantage than monolingual children with SLI?
4. A 58-year-old professional Greek-English translator suffered a CVA (stroke) in the anterior portion of the left hemisphere. Given his bilingual status and the corresponding neural localization of language, what, if any, aspects of language (Greek and English) would you expect to be affected as a result of this damage to the brain? Are there any other functional areas that might be affected?
5. The unintentional mixing or switching between two languages in bilingual adults following brain damage has been documented in the literature. How is this "pathological switching" different from the code-switching sometimes used by healthy proficient bilingual adults? From a cognitive perspective, what is the reason for language mixing in acquired aphasia? Should bilinguals with aphasia be encouraged to restrict their production to a single language? Why or why not?

Suggested Research Projects

1. Go to the Child Language Data Exchange System (CHILDES) database (http://childes.psy.cmu.edu). Select one language sample from the Clinical Corpora data base and analyze it in

terms of its content (total words and number of different words), form (grammatical length and complexity), and use (function of the utterance). Select another sample from the bilingual corpora and analyze it in the same way. You may prefer to collect your own language samples for analysis by visiting a local preschool program. Then briefly compare and contrast the two language samples to identify areas of overlap as well as potentially clinically significant aspects on which the samples differ. Summarize your impressions, noting any potential limitations in your interpretations relative to the language sample. Indicate what additional information is needed for an adequate assessment.

2. One of the most persistent areas of impairment following acquired brain damage is in lexical access and production, as measured on confrontation naming tasks. Confrontation naming tasks require the individual to name pictured objects. On standardized tests of confrontation naming, the pictured objects are graded in difficulty, with more familiar objects shown first (*bed*, *pencil,* and *tree*) and less common items shown later (*trellis*, *palate,* and *abacus*; see *Boston Naming Test* by Kaplan, Goodglass, & Weintraub, 1983). This graded level of frequency across items is designed to allow the examiner to estimate the severity of impairment based on performance. One complication in interpreting performance on these tasks when working with bilingual individuals is that stimulus difficulty may differ with the individual's experiences in each language. To test the effects of language experience on typical bilingual confrontation naming performance, select 20 pictures of objects—some very common (*apple*, *chair*, *dog*) and others less so (*thumb*, *tack*, *antelope*, *wrench*). You may use the picture database at: http://www.crl.ucsd.edu/~aszekely/ipnp/1studies.html#PNO. Ask your bilingual classmates to name these pictures in each of the languages they speak. Record their performance and analyze any errors. Compare and discuss your results to those found by Kohnert, Hernandez, and Bates (1998).

Suggested Readings

Kohnert, K. (2007). *Language disorders in bilingual children and adults*. San Diego: Plural Publishing.

Kohnert, K., & Derr, A. (2004). Language intervention with bilingual children. In B. Goldstein (Ed.), *Bilingual language development and disorders in Spanish-English speakers* (pp. 315–343). Baltimore: Brookes Publishing.

Kohnert, K., & Windsor, J. (2004). In search of common ground–Part II: Non-linguistic performance by linguistically diverse learners. *Journal of Speech, Language, and Hearing Research*, 47, 891–903.

Leonard, L. (1998). *Children with specific language impairment*. Cambridge, MA: MIT Press.

Paradis, M. (1995) (Ed.). *Aspects of bilingual aphasia* (pp. 211–223). Oxford: Pergamon.

Paradis, M. (2004). *A Neurolinguistic theory of bilingualism*. Amsterdam/Philadelphia: Benjamins.

Roberts, P. (1998). Clinical research needs and issues in bilingual aphasia. Aphasiology, 12, 119–130.

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References

Albert, M. L., & Obler, L. K. (1978). *The bilingual brain.* New York: Academic Press.

Argulewicz, E. N., & Sanchez, D. T. (1983). The special education evaluation process as a moderator of false positives. *Exceptional Children, 49*(5), 452–454.

Bialystok, E. (2001). *Bilingualism in development: Language, literacy, & cognition.* Cambridge, UK: Cambridge University Press.

Bonita, R. (1992). Epidemiology of stroke. *Lancet,* 339(8789), 342–344.

Chapey, R. (2001). *Language intervention strategies in aphasia and related neurogenic communication disorders* (4th ed.). Baltimore: Williams & Wilkins.

Cleave, P., & Rice, M. (1997). An examination of the morpheme BE in children with specific language impairment: The role of contractibility and grammatical form class. *Journal of Speech, Language, and Hearing Research, 40*, 480–492.

Darley, F. L. (1982). *Aphasia.* Philadelphia: W. B. Saunders.

Davis, G. A. (2000). *Aphasiology: Disorders and Clinical Practice*. Needham Heights, MA: Allyn and Bacon.

Dehaene, S. (1999). Fitting two languages into one brain. *Brain, 122*, 2207–2208.

Dijkstra, T., Grainger, J., & van Heuven, W. (1999). Recognition of cognates and interlingual homographs: The neglected role of phonology. *Journal of Memory and Language, 41*, 496–518.

Fabbro, F. (1999). *The neurolinguistics of bilingualism: An introduction*. East Sussex, UK: Psychology Press.

Fabbro, F. (2000). The bilingual brain: Bilingual aphasia. *Brain and Language, 79*, 201–210.

Fabbro, F. (2001). The bilingual brain: Cerebral representation of languages. *Brain and Language, 79,* 211–222.

Fabbro, F., Skrap, M., & Aglioti, S. (2000). Pathological switching between languages after frontal lesions in a bilingual patient. *Journal of Neurology, Neurosurgery, & Psychiatry, 68*, 650–652.

Flax, J., Realpe-Bonilla, T., Hirsch, L., Brzustowicz, L., Bartlett, C., Tallal, P. (2003). Specific language impairment in families: Evidence for co-occurrence with reading impairments. *Journal of Speech, Language, and Hearing Research, 46*, 530–543.

Fredman, M. (1975). The effect of therapy given in Hebrew on the home language of the bilingual or polyglot adult aphasic in Israel. *British Journal of Disorders and Communication, 10*, 61–69.

Green, D. W. (1998). Mental control of the bilingual lexico-semantic system. *Bilingualism: Language and Cognition, 1*, 67–81.

Gutierrez-Clellen, V. (1999). Language choice in intervention with bilingual children. *American Journal of Speech-Language Pathology, 8*, 291–302.

Håkansson, G., & Nettelbladt, U. (1996). Similarities between SLI and L2 children: Evidence from the acquisition of Swedish word order. In C. E. Johnson & J. H. V. Gilbert (Eds.), *Children's language* (Vol. 9, pp. 135–151). Mahwah, NJ: Lawrence Erlbaum Associates.

Helm-Estabrooks, N. (1998). A "cognitive" approach to treatment of an Aphasic patient. In N. Helm-Estabrooks & A. Holland (Eds.), *Approaches to the treatment of Aphasia* (pp. 69–89). San Diego: Singular.

Hernández, A. E., & Kohnert, K. (1999). Aging and language switching in bilinguals. *Aging, Neuropsychology and Cognition, 6*(2), 69–83.

Junqué, C., Vendrell, P., Vendrell-Brucet, J. M., & Tobeña, A. (1989). Differential recovery in naming in bilingual aphasics. *Brain and Language, 36*, 16–22.

Kaplan, E., Goodglass, H., & Weintraub, S. (1983). *Boston naming test*. Philadelphia: Lee & Febiger.

Kan, P. F., & Kohnert, K. (2005). Preschoolers learning Hmong and English: Lexical-semantic skills in L1 and L2. *Journal of Speech, Language, and Hearing Research*, *48*, 1–12.

Kirshner, H. S. (1995). *Handbook of neurological speech and language disorders*. New York: Marcel Dekker.

Kohnert, K. (2007). *Language disorders in bilingual children and adults*. San Diego: Plural Publishing.

Kohnert, K. (2004a). Children learning a second language: Processing skills in early sequential bilinguals. In B. Goldstein (Ed.), *Bilingual language development and disorders in Spanish-English speakers* (pp. 53–76). Baltimore: Brookes.

Kohnert, K. (2004b). Cognitive and cognate treatments for bilingual aphasia: A case study. *Brain and Language, 91*, 294–302.

Kohnert, K. (2002). Picture naming in early sequential bilinguals: A 1-year follow-up. *Journal of Speech, Language, and Hearing Research, 45*, 759–771.

Kohnert, K., & Bates, E. (2002). Balancing bilinguals II: Lexical comprehension and cognitive processing in children learning Spanish and English. *Journal of Speech, Language, and Hearing Research, 45*, 347–359.

Kohnert, K., Bates, E., Hernández, A. E. (1999). Balancing bilinguals: Lexical-semantic production and cognitive processing in children learning Spanish and English. *Journal of Speech, Language, and Hearing Research, 42,* 1400–1413.

Kohnert, K., & Derr, A. (2004). Language intervention with bilingual children. In B. Goldstein (Ed.), *Bilingual language development and disorders in Spanish-English speakers* (pp. 315–343*).* Baltimore: Brookes Publishing.

Kohnert, K. J., Hernández, A. E., & Bates, E. (1998). Bilingual performance on the Boston naming test: Preliminary norms in Spanish and English. *Brain and Language, 65,* 422–440.

Kohnert, K., Kennedy, M., Glaze, L., Kan, P., & Carney, E. (2003). Breadth and depth of diversity in Minnesota: Challenges to clinical competency. *American Journal of Speech-Language Pathology, 12,* 259–272.

Kohnert, K., Yim, D., Nett, K., Kan, P. F., & Duran, L. (2005). Intervention with linguistically diverse preschool children with language impairment. *Language, Speech, and Hearing Services in the Schools, 36,* 251–263.

Kohnert, K., & Windsor, J. (2004). In search of common ground-part II: Non-linguistic performance by linguistically diverse learners. *Journal of Speech, Language, and Hearing Research*, *47*, 891–903.

Lalor, E., & Kirsner, K. (2001). The role of cognates in bilingual aphasia: Implications for assessment and treatment, *Aphasiology, 15*, 1047–1056.

Leonard, L. (1998). *Children with specific language impairment*. Cambridge, MA: MIT Press.

Leseman, P. (2000). Bilingual vocabulary development of Turkish preschoolers in the Netherlands. *Journal of Multilingual and Multicultural Development, 21*, 93–112.

Luria, A. R. (1966). *Higher cortical functions in man.* New York: Basic Books.

Marchman, V., Wulfeck, B., & Ellis Weismer, S. (1999). Morphological productivity in children with normal language and SLI: A study of the English past tense. *Journal of Speech, Language, and Hearing Research, 37*, 171–181.

Martin, A. D. (1981). An examination of Wepman's thought centered therapy. In R. Chapey (Ed.), *Language intervention strategies in adult aphasia* (pp. 141–154). Baltimore: Williams and Wilkins.

Miller, C., Kail, R., Leonard, L., & Tomblin, B. (2001). Speed of processing in children with specific language impairment. *Journal of Speech, Language, and Hearing Research, 44,* 416–433.

Muñoz, M. L., Marquardt, T. P., & Copeland, G. (1999). A comparison of codeswitching patterns of aphasic and neurologically normal bilingual speakers of English and Spanish. *Brain and Language, 66*, 249–274.

National Aphasia Association (2004). Retrieved October 20, 2004, from http://www.aphasia.org

Paradis, M. (1977). Bilingualism and aphasia. In H. A. Whitaker & H. Whitaker (Eds.), *Studies in neurolinguistics* (Vol. 3, pp. 65–121). New York: Academic Press.

Paradis, M. (1998). Aphasia in bilinguals: How atypical is it? In P. Coppens & Y. Lebrun (Eds.), *Aphasia in atypical populations* (pp. 35–66). Mahwah, NJ: Lawrence Erlbaum Associates.

Paradis, M. (2000). Generalizable outcomes of bilingual aphasia research. *Folia Phoniatrica et Logopaedica, 52*, 65–73.

Paradis, J., & Crago, M. (2000). Tense and temporality: A comparison between children learning a second language and children with SLI. *Journal of Speech, Language, and Hearing Research, 43*, 834–847.

Paradis, J., Crago, M., Genesee, F., & Rice, M. (2003). Bilingual children with specific language impairment: How do they compare with their monolingual peers? *Journal of Speech, Language, and Hearing Research, 46*, 1–15.

Peña, E., Bedore, L., & Zlatic-Giunta, R. (2002). Category-generation performance of bilingual children: The influence of condition, category, and language. *Journal of Speech, Language, and Hearing Research, 45*, 938–947.

Pettito, L., Katerelos, M., Levy, B., Gauna, K., Tétreault, K., & Ferraro, V. (2001). Bilingual signed and spoken language acquisition from birth: Implications for the mechanisms underlying early bilingual language acquisition. *Journal of Child Language, 28,* 453–496.

Plomin, R., & Dale, P. S. (2000). Genetics and early language development: A UK study of twins. In D. V. M. Bishop & L. B. Leonard (Eds.), *Speech and language impairments in children: Causes, characteristics, intervention and outcome.* Philadelphia: Psychology Press.

Price, C., Green, D., & von Studnitz, R. (1999). A functional imaging study of translation and language switching. *Brain, 122*, 2221–2235.

Roberts, P., & Deslauriers, L. (1999). Picture naming of cognate and non-cognate nouns in bilingual aphasia. *Journal of Communication Disorders, 32*, 1–23.

Roseberry-McKibbin, C. A., & Eicholtz, G. E. (1994). Serving children with limited English proficiency in the schools: A national survey. *Language, Speech, and Hearing Services in Schools, 25,* 156–164.

Scarry-Larkin, M. (1999). *Attention and Memory, Vol. 1.* San Luis Obispo, CA: LocuTour Multimedia Cognitive Rehabilitation.

Schiff-Myers, N. (1992). Considering arrested language development and language loss in the assessment of second language learners. *Language, Speech, and Hearing Services in the Schools, 23*, 28–33.

Snow, C. E. (1990). The development of definitional skill. *Journal of Child Language, 17*, 697–710.

Stothard, S. E., Snowling, M. J., Bishop, D. V. M., Chipchase, B. B., & Kaplan, C. A. (1998). Language-impaired preschoolers: A follow-up into adolescence. *Journal of Speech, Language, and Hearing Research, 41*, 407–418.

Thal, D., & Katich, J. (1996). Predicaments in early identification of specific language impairment: Does the early bird always catch the worm? In K. Cole, P. Dale, & D. Thal (Eds.), *Assessment of communication and language* (pp. 1–28). Baltimore: Brookes Publishing.

Thordardottir, E., Ellis Weismer, S., & Smith, M. (1997). Vocabulary learning in bilingual and monolingual clinical intervention. *Child Language Teaching and Therapy, 13*(3), 215–227.

Tomblin, J. B., & Buckwalter, P. R. (1998). Heritability of poor language achievement among twins. *Journal of Speech, Language, and Hearing Research, 41*, 188–199.

Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language, and Hearing Research, 40*, 1245–1260.

U.S. Bureau of the Census (2000). *Statistical abstract of the United States* (120th ed.). Washington, DC.

Van Mourik, M., Verschaeve, M., Boon, P., Paquin, P., & Van Harkskamp, F. (1992). Cognition in global aphasia: Indicators for therapy. *Aphasiology, 6*, 491–499.

Watamori, T., & Sasanuma, R. J. (1978). The recovery processes of two English-Japanese bilingual aphasics. *Brain and Language, 6*, 127–140.

Windsor, J., & Kohnert, K. (2004). In Search of Common Ground-Part I: Lexical Performance by Linguistically Diverse Learners. *Journal of Speech, Language, and Hearing Research, 47*, 877–890.

Windsor, J., Milbrath, R., Carney, E., & Rakowski, S. (2001). General slowing in language impairment: Methodological considerations in testing the hypothesis. *Journal of Speech, Language, and Hearing Research, 44*, 446–461.

Winter, K. (1999). *Under-and over representation of bilingual children in speech and language therapy services in England*. Paper presented at the Second International Symposium on Bilingualism, Newcastle upon Tyne, UK.

Chapter 14

Bilingual Education in the United States

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Introduction

Bilingual Education will be defined here as the application of specialized educational techniques to enhance the learning opportunities of students who come to school speaking a native language other than the predominant language of instruction. These students are referred to as language minority students, Limited English Proficient students, and also as English Language Learners (ELLs) in the United States. Bilingual Education has received considerable research, and policy and practice attention because of the continued presence of non-English speaking immigrants and indigenous people of the United States who do not speak English as their native language. The U.S. Congress has authorized legislation targeted directly at these students on six separate occasions (1968, 1974, 1984, 1987, 1994, & 2001) while numerous states have enacted legislation and developed explicit program guidelines. The U.S. Federal District Courts and the U.S. Supreme Court have specific enunciated judgments that protect the rights of language minority students. In response to these actions, U.S. schools have developed various models of bilingual education. The intent of this chapter is to provide an overview of bilingual education in the United States with a focus on who is served by bilingual education, what research and educational practices indicate about bilingual education, and what policies have been generated at the federal and state levels regarding the students who are the focus of bilingual education.

Who Are These Students?

The present system of legally articulated labels for such children identifies these students as Limited English Proficient (LEP). Because of the interaction with two languages (home language and school language), I will refer to them often in this chapter as bilingual. These students come in a variety of linguistic shapes and forms. In the United States, these students are linguistically heterogeneous with over 180 distinct language groups identified. Even in the largest language minority ethnic group, members of this *Hispanic* group are monolingual Spanish speakers while others are to some degree Spanish/English bilinguals. Other non-English-speaking minority groups in the United States are similarly heterogeneous. Not inconsequential are the related cultural attributes of this population of students, making this population not only linguistically diverse but also culturally diverse. Estimates of the number of language minority students in the United States differ because of the definition adopted for identifying these students, the particular measure utilized to obtained the estimate, and the statistical treatment utilized to generalize beyond the actual sample obtained. Consequently, recent estimates of language minority students have ranged from 2,500,000 to 4,600,000, some 7% to 10% of the U.S. student population.

Education Comes in Diverse Shapes and Forms for U.S. Bilinguals

For a school district staff with bilingual students, there are many possible program options: *transitional bilingual education*, *maintenance bilingual education*, *English-as-a-second-language*, *immersion*, *sheltered English*, and *submersion*. Various program types have also been developed by the U.S. Government Accounting Office in 1987. Ultimately, staff should reject program and model labels and instead answer the following questions:

1. What are the native language and English language characteristics of the students, families, and communities we serve?
2. What model of instruction is desired?
   (a) How do we choose to use the native language and English as *mediums of instruction?*
   (b) How do we choose to handle the instruction of the native language and English?
3. What is the nature of staff and resources necessary to implement the desired instruction? (Garcia, 2001a)

These program initiatives can be differentiated by the way they use the native language and English during instruction (Ovando & Collier, 1998). In the most recent yet highly outdated (no new national survey has been conducted since 1993) national survey, Development Associates (1993) surveyed 333 school districts in the 19 states that serve over 80% of language minority students in the United States. For grades K–5, they report the following salient features about the use of language(s) during the instruction of language minority students:

1. Ninety-three percent of the schools reported that the use of English predominated in their programs; seven percent indicated that the use of the native language predominated.
2. Sixty percent of the sampled schools reported that both the native language and English were used during instruction.
3. Thirty percent of the sampled schools reported minimal or no use of the native language during instruction.

Programs that serve these students have been characterized primarily as *Bilingual Transitional Education* programs (Ovando & Collier, 1998). These programs transition students from early-grade, native language-emphasis instruction to later-grade, English-emphasis instruction, and eventually to English-only instruction. Other programs that use the primary language are discussed later in this book and emphasize maintaining proficiency in the native language while adding English proficiency—these will be referred to as *Dual Language Programs*.

For the one third of the students receiving little or no instruction in their native language, two alternative types of instructional approaches likely predominate: English Language Development/English as a Second Language (ELD/ESL) and Sheltered English Immersion (SEI). Each of these program types depends on the primary use of English during instruction but does not ignore the fact that the students served are limited in English proficiency. However, these programs do not require instructional personnel who speak the native language of the student. Moreover, these programs are suited to classrooms in which there is no substantial number of students from one non-English-speaking group, but instead may have a heterogeneous non-English-background student population.

School district staffs have been creative in developing a wide range of language minority student programs. They have answered the previous questions differentially for: (a) different language groups (Spanish, Vietnamese, Chinese, etc.); (b) different grade levels within a school; (c) different subgroups of language minority students within a classroom; and (d) even different levels of language proficiency. The result has been a broad and at times perplexing variety of instructional arrangements (August & Hakuta, 1997; Garcia, 2001a; Ovando & Collier, 1998). This chapter addresses the theoretical and related goals of these diverse instructional arrangements.

Schooling Practices

The Debate

The United States has been characterized by a long-standing debate regarding the educational treatment of its bilingual students, particularly those of Spanish language backgrounds. Linda Chavez, a journalist, TV commentator and author of *Out of the Barrio: Toward a New Politics of Hispanic Assimilation* (1992) suggests:

> Every previous group—Germans, Irish, Italians, Greeks, Jews, and Poles—struggled to be accepted fully into the social, political and economic mainstream, sometimes against the opposition of a hostile majority. They learned the language, acquired education and skills, and adapted their own customs and traditions to fit an American context. (p. 2)

The key for success in the United States, Chavez argues, is minimizing the public and governmental recognition of students' native languages while promoting the assimilation into *mainstream* English speaking society. She chides the government, particularly federal bilingual education programs during the 1960s through the 1990s, for promoting permanent victim status and entitling people to government grants that promote bilingualism. Educational support, she believes, encourages students to maintain their language and culture, their specific identity, in return for rewards handed out through federal, state, and local educational policies that thwart assimilation.

Another author, Richard Rodriguez (1985), is relevant to this argument. His eloquent description of his upbringing in a *Mexican* home and a private Catholic school illustrates the school's influence on students' learning. His book, *Hunger of Memory* (1985) describes this forced assimilation, painful as it was, which propelled him to new heights of educational achievement. In Richard's story, the English-speaking nuns literally beat the Spanish out of him. Hakuta (1986), Cummins (1997), Garcia (2001b) and others reached a very different conclusion. They argued that bilingualism is a positive linguistic, social, and educational characteristic that should be developed in those children who come to school not speaking English. Crawford has on a number of occasions (Crawford, 1998, 1999, & 2000) articulated a set of misunderstandings or myths that are useful in beginning to sort through this U.S. debate (adapted from Crawford, 1998):

Myth 1: English Is Losing Ground to Other Languages in the United States

More world languages are spoken in the United States today than ever before. However, this is a quantitative, not a qualitative change from earlier periods. Concentrations of non-English language speakers were common in the nineteenth century, as reflected by laws authorizing native language instruction in a dozen states and territories. In large cities as well as rural areas, children attended bilingual and non-English schools, learning in languages as diverse as French, Norwegian, Czech, and Cherokee. Yet English survived without any help from the government, such as official-language legislation.

Myth 2: Newcomers to the United States Are Learning English More Slowly Now than in Previous Generations

To the contrary, today's immigrants appear to be acquiring English more rapidly than ever before. While the number of minority language speakers is projected to grow well into the next century, the number of bilinguals fluent in both English and another language is growing even faster. Between 1980 and 1990, the number of immigrants who spoke non-English languages at home increased by 59%, while the portion of this population who spoke English very well rose by 93% (Waggoner, 1995). In 1990, only 3% of U.S. residents reported speaking English less than *well* or *very well*. Only eight tenths of one percent spoke no English at all. About three in four Hispanic immigrants, after 15 years in this country, speak English on a daily basis, while 70% of their children become dominant or monolingual in English.

Myth 3: The Best Way to Learn a Language Is through "Total Immersion"

There is no credible evidence to support the *time on task* theory of language learning—the claim that the more children are exposed to English, the more English they will learn. Learning English in schooling contexts is a complex process (August & Hakuta, 1997).

Myth 4: School Districts Provide Bilingual Instruction in Scores of Native Languages

Where children speak a number of different languages, rarely are there sufficient numbers of each language group to make bilingual instruction practical for everyone. In any case, the shortage of

qualified teachers usually makes it impossible. For example, in 1994 California enrolled recently arrived immigrants from 136 different countries, but bilingual teachers were certified in only 17 languages, 96% of them in Spanish.

Myth 5: Bilingual Education Means Instruction Mainly in Students' Native Languages, with Little Instruction in English

Before 1994, the vast majority of U.S. bilingual education programs were designed to encourage an early exit to mainstream English language classrooms, while only a tiny fraction of programs were designed to maintain the native tongues of students.

Today, a majority of bilingual programs continue to deliver a substantial portion of the curriculum in English. For example, Garcia (1999) found that a randomly selected cohort of school districts in California reported that 28% of LEP elementary school students receive no native-language instruction. Among those who do, about one third receives more than 75% of their instruction in English; one third receives from 40% to 75% in English; and one third of these receive less that 40% in English. Secondary school students are less likely to be instructed in their native language than elementary school students.

Myth 6: Bilingual Education Is Far More Costly than English Language Instruction

All programs serving LEP students—regardless of the language of instruction—require additional staff training, instructional materials, and administration. So they all cost a little more than regular programs for native English speakers. But in most cases, the differential is modest. A study commissioned by the California legislature examined a variety of well-implemented program models and found no budgetary advantage for English-only approaches. The incremental cost was about the same each year ($175–$214) for bilingual and English immersion programs, compared to $1,198 for English as a second language (ESL) *pullout* programs. The reason was simple: the pullout approach requires supplemental teachers, whereas in-class approaches do not (Chambers & Parrish, 1992). Nevertheless, ESL pullout remains the method of choice for many school districts, especially where LEP students are diverse, bilingual teachers are in short supply, or expertise is lacking in bilingual methodologies.

Myth 7: Disproportionate Dropout Rates for Hispanic Students Demonstrate the Failure of Bilingual Education

Hispanic dropout rates remain unacceptably high. Research has identified multiple factors associated with this problem, including recent arrival in the United States, family poverty, limited English proficiency, low academic achievement, and being retained in grade school (Lockwood, 1996). No credible studies, however, have identified bilingual education among the risk factors, because a small minority of Hispanic children is in bilingual programs.

Myth 8: Language-Minority Parents Do Not Support Bilingual Education because They Feel It Is More Important for Their Children to Learn English than to Maintain the Native Language

Naturally, when pollsters place these goals in opposition, immigrant parents will opt for English by wide margins. Who knows better the need to learn English than those who struggle with language barriers on a daily basis? But the premise of such surveys is false. Truly bilingual programs seek to cultivate proficiency in both languages, and research has shown that students' native language can be maintained and developed at no cost to English (Christian, 1994). When polled on the principles underlying bilingual education—for example, that developing literacy in the first language facilitates literacy development in English or that bilingualism offers cognitive and career-related advantages—a majority of parents are strongly in favor of such approaches (Lindholm, 1999).

Allow me to shift away from this debate, although later it will resurface in my discussion of national, state, and local policies that influence the education of bilingual students. Instead, after acknowledging that the debate continues, allow me to turn to educational research that has attempted to inform which instruction and learning features serve bilingual students well.

What Works: Optimal Instruction and Learning Features

August and Hakuta (1997) provide a comprehensive review of optimal learning conditions that serve linguistically and culturally diverse populations leading to high academic performance. They reviewed a total of 33 studies. As a result, the following attributes were identified by this case study research strategy:

> A supportive school-wide climate, school leadership, a customized learning environment, articulation and coordination within and between schools, use of native language and culture in instruction, a balanced curriculum that includes both basic and higher-order skills, explicit skill instruction, opportunities for student-directed instruction, use of instructional strategies that enhance understanding, opportunities for practice, systematic student assessment, staff development, and home and parent involvement. (August & Hakuta, 1997, p. 171)

These features resonate with other recent studies of effectiveness for programs specifically designed for linguistically and culturally diverse populations. California Tomorrow (1995), in a study of early childhood care in California, concluded that a set of principles guided quality child care across a variety of care settings that serve a growing community of linguistically and culturally diverse families. These principles included:

1. Support the development of ethnic identity and antiracist attitudes among children.
2. Build upon the cultures of families and promote cross-cultural understanding among children.
3. Foster the preservation of children's home language and encourage bilingualism among all children.
4. Engage in on-going reflection and dialogue (p. 8).

In a state mandated study of exemplary schools serving the state's linguistically and culturally diverse students, several key attributes were common across schools (Berman, 1996). These features

included: (a) *flexibility*—adapting to the diversity of languages, mobility, and special non-school needs of these students and their families; (b) *coordination*—utilizing sometimes scarce and diverse resources, such as federal and state moneys and local community organizations in highly coordinated ways to achieve academic goals; (c) *cultural validation*—schools validated their students' cultures by incorporating materials and discussions that built on the linguistic and cultural aspects of the community; and (d) *a shared vision*—a coherent sense of who the students were and what they hoped to accomplish led by a school's principal, staff, instructional aides, parents, and community (Berman, 1996).

Similarly, three more recent *effective-exemplary* analyses of schools that serve high percentages of linguistically and culturally diverse students nationally are worthy of mention (Thomas & Collier, 2000). Three key factors are reported as significant in producing academic success for students in studies of five urban and suburban school districts in various regions of the United States. The studies focus on the length of time needed to be academically successful in English and consider factors influencing academic success, such as the student, program, and instructional variables. These studies include about 42,000 student records per school year and from 8 to 12 years of data from each school district.

1. Cognitively complex academic instruction through students' home language for as long as possible and through second language for part of the school day.
2. Use of current approaches to teaching academic curriculum using both students' home language and English through active discovery, and cognitively complex learning.
3. Changes in the sociocultural context of schooling, such as integrating English speakers, implementation of additive bilingual instructional goals, and transformation of minority/majority relations to a positive plane (Thomas & Collier, 2000).

A series of case studies of exemplary schools throughout the United States serving highly diverse and poor student populations also illustrates what can be done to promote academic excellence (McLeod, 1996). In these studies, selected schools with demonstrated academic success records were subjected to intensive site-by-site study with the goal of identifying specific attributes at each site related to the functioning of the school, as well as a more ambitious effort to identify common attributes across the sites. Schools in four states (Texas, Illinois, California, and Massachusetts) were particularly successful in achieving high academic outcomes with a diverse set of students and used these common goals for ensuring high quality teaching.

Foster English Acquisition and the Development of Mature Literacy

Schools used native language abilities to develop literacy that promoted English literacy development. Programs in these schools were more interested in this mature development than transitioning students quickly into English language instruction. This approach paid off in English language development at levels that allowed students to be successful in English instruction.

Deliver Grade-Level Content

Challenging work in the academic disciplines was perceived and acted on simultaneously with the goals of English language learning. Teachers organized lessons to deliver grade-level instruction through a variety of native language, sheltered English, and ESL activities.

Organize Instruction in Innovative Ways

Examples of innovations included: (a) *schools-within-schools* to more responsively deal with diverse language needs of the students; (b) *families* of students who stayed together for major parts of the school day; (c) *continuum classes* in which teachers remained with their students for two to three years, helping teachers become more familiar with and respond to student diversity; and (d) grouping of students more flexibly on a continuous basis so as to respond to the developmental differences between their native and second language.

Protect and Extend Instructional Time

Schools used after-school programs, supportive computer-based instruction, and voluntary Saturday schools and summer academies to multiply the opportunities for students to engage in academic learning. Regular teachers or trained tutors were used to extend this learning time. Not surprisingly, a majority of students took advantage of these voluntary extensions. Care was taken not to erode the daily instructional time that was available—erosion often related to auxiliary responsibilities by teachers that take valuable time away from instruction.

Expand the Roles and Responsibilities of Teachers

Teachers were given much greater roles in curricular and instructional decision-making. This decision-making was much more collective in nature to ensure cross-grade articulation and coordination. Teachers in these schools became full co-partners. They devised more *authentic* assessments that could inform instruction, and developed assessment tools and scoring rubrics in reading and mathematics.

Address Students' Social and Emotional Needs

Schools were located in low-income neighborhoods serving poor families. Therefore, a proactive stance with regards to issues in these communities was adopted. An after-school activity that was aimed at families, particularly dealing with issues of alcohol and drug abuse, family violence, health care, and related social service needs, brought the school staff together with social service agencies at one school site. Similar examples of actual family counseling and direct medical care were arranged at other sites.

Involve Parents in Their Children's Education

Some of the schools were magnet schools. Parents had chosen to send their children to these schools. Parent involvement was part of the magnet school contract in these schools. Other areas of parental involvement included participation in school committees, school festivals and celebrations, student field trips, and other activities. In non-magnet schools, parent outreach services were an integral part of the school operation. In all cases, communication was accomplished on a regular basis in various home languages. Parent participation in governance of the school was a common attribute, although levels of parent participation were highly variable (adapted from McLeod, 1996, pp. 13–33).

Dual Language Programs

The Dual Language programs (DL) are relatively new in the United States. These programs aim to create bilingual, bicultural students without sacrificing these students' success in school or beyond. Unique among programs, the goals of DL are to provide high-quality instruction for language minority students and to provide instruction in a second language for English-speaking students. Schools teach children language through content, with teachers adapting their instruction to ensure children's comprehension and using content lessons to convey vocabulary and language structure. Striving for half language-minority students and half English-speaking students in each classroom, DL programs also aim to teach cross-cultural awareness. Programs vary in terms of the amount of time they devote to each language, which grade levels they serve, how much structure they impose for the division of language and curriculum, and what populations they serve.

There are two most widely adopted models of language division. In the 50:50 model, instruction is given half the day in English and half the day in Spanish throughout the grades. In the 90:10 model, children spend 90% of their kindergarten school days in the minority language, and that percentage gradually drops to 50% by fourth or fifth grade. Currently in the United States, there are over 225 DL programs, and the number is growing rapidly (Christian, 1999). While the vast majority offers instruction in Spanish and English, there are programs that target Korean, Cantonese, Arabic, French, Japanese, Navajo, Portuguese, and Russian (Christian, 1997).

Two-Way Immersion Programs have three major goals: to help language minority children to learn English and find success in U.S. schools; to help language majority children learn a foreign language without sacrificing their own success in school; and to promote linguistic and ethnic equity among the children, encouraging children to bridge the gaps between cultures and languages that sadly divide our society. These goals are naturally interdependent. An English-speaking child who is helped to understand that another language and culture holds equal importance to their own will be more interested in learning about that culture and in acquiring that language. A language minority child who is given higher school status due to their knowledge of their home language will have more confidence in their ability to learn English. Children who learn the language of their peers are more likely to want to become friends with them, regardless of racial or ethnic background.

Lambert (1990) suggests that DL programs are a perfect resolution to the strange and prevalent dichotomy between foreign language education and bilingual education in U.S. schools. He further suggests that the purpose of *Second Language pedagogy* is bringing "Language minority families into the American mold, to teach them our national language, to help them wash out as quickly as possible old country ways" (p. 323). On the other hand, "The foreign Language approach aims to add refinement and international class to the down-to-earth, eminently practical American character" (p. 324). His clear conclusion: Two-Way Immersion will improve language teaching for everyone, both second language learners and foreign language learners in the same classroom. However, Valdes (1998) warns practitioners and researchers to be cautious. The attempt to meet the needs of two such different populations in one program is a difficult proposition and brings to the fore many questions of power distribution in the classroom and in society. Valdes warns practitioners that when they modify the target language so that majority language students can comprehend, they may be watering down the language for language minority students. There is a difference, Valdes (1998) asserts, between the acquisition of English for minority children and the acquisition of a foreign language for majority children: For minority children, the acquisition of English is expected. For mainstream children, the acquisition of a non-English language is enthusiastically applauded.

As these sets of issues continue to receive attention, there is evidence to suggest that DL is an excellent model for academic achievement for language minority children. It appears to promote English language learning as well or better than other special programs designed for language minority children. One hundred percent of Spanish dominant children in the Key School, a 50/50 DL school in Arlington County, Virginia, demonstrated oral English fluency by third grade, as shown by the LAS-O Oral English Proficiency measure and classroom observations (Christian, 1997). Further, English writing samples collected from native Spanish speakers in fifth and sixth grade were indistinguishable from those of native English speakers, and all were of high quality (Christian, 1997). In a separate study of four DL schools following the 90:10 program model in California, it was found that by fifth grade most students were clearly fluent in English, and made good gains in English reading at most school sites (although they did not attain grade-level performance in reading; Lindholm, 1999).

DL also appears to encourage achievement in the academic subjects in both English and the minority languages. In a study comparing DL students to a control population, Christian (1994) found that third graders from the Amigos Dual Immersion Program in Cambridge, Massachusetts outperformed a Spanish speaking cohort in a more conventional bilingual education program in reading and mathematics in both Spanish and English. In fact, these children performed consistently at or slightly below grade-level norms for children their age, which included English speaking children. DL provided these children with the tools they needed to perform well in school assessments in English, even though the majority of their school time had been spent in Spanish instruction. This was further shown in a study conducted several years later at the Amigos school. Here, children from fourth through eighth grade were shown to consistently perform at least as well and often significantly better than control populations on standardized tests in both English and Spanish. In Lindholm's (1999) study of four 90:10 schools in California, Spanish bilingual students scored at grade level in mathematics in Spanish, and at or below grade level in mathematics in English. Performance in science and social studies was average to very high. Lindholm notes that these scores should be compared to California's scores in general, which are the lowest of all 50 states; thus, to report that DL students "Were scoring at or above grade level in reading and mathematics means that these students were scoring better than most students in California" (p. 16).

Spanish-speaking children in DL programs seem to maintain or improve their oral Spanish proficiency as well. At the Key School, while only 88% of first grade Spanish-speaking children tested as fluent in Spanish, in grades 2 and above Spanish-speaking children all tested as fluent in Spanish. Christian (1997) asserts that this finding is similar to findings from previous years; even Spanish-dominant students seem to make oral gains in Spanish in these programs. California Spanish bilingual students in 90:10 programs also "Maintained high levels of proficiency in their first language" (Lindholm, 1999, p. 15). This provides evidence to allay Valdez's fear that DL programs may water down Spanish language instruction for minority children.

The evidence for English-speaking children is more mixed. It is clear that these students' English skills do not suffer at all from their time spent learning content in another language. English-speaking students in the Amigos program in Cambridge perform comparably to English controls in English reading and English-based mathematics at all grade levels (Christian, 1994). English bilingual students from DL programs in California "Maintained high levels of proficiency in their first language" (p. 31) throughout their years in the program, and performed at or above grade level in English reading, mathematics, social studies, and science as measured by a nationwide norm and standardized test (Lindholm, 1999).

While it does appear that English-speaking children gain strong skills in their second language through their schooling alone, there are gaps in their language knowledge, probably attributable to the fact that English, not the target language, is the dominant language in our society. It is also difficult to determine whether their language acquisition is up to par, because there is no comparison of children learning a second language with which to compare them; comparing them to Spanish-speaking children learning English, as Valdes (1998) pointed out (see previous discussion), can be confounding. In general, English speakers are not found to gain strong Spanish oral fluency in DL programs. Christian's (1994) findings at the Key School indicated that only 50% of English-dominant fourth and fifth graders demonstrated Spanish fluency (by the measures and classroom observations), in contrast to 100% of Spanish-dominant third graders in English. Lindholm (1999) found in her examination of 90:10 programs in California that "While most Spanish bilingual students were clearly fluent in English, many English bilingual students lacked the fluency, vocabulary and grammar to converse entirely in Spanish about a variety of topics" (p. 15).

Freeman (1998) describes in detail the dual immersion approach at Oyster School in Washington, DC, an educational institution acknowledged for its leadership in bilingual, multicultural education. Goals for the Oyster School include bilingualism for both native learners and bilinguals, a high expectation of academic achievement for all, and "A culturally pluralistic atmosphere" in which mutual acceptance is emphasized (p. 242). Freeman's study shows that at Oyster while academic achievement is more emphasized in English than in Spanish, the school is largely successful. The researcher also emphasizes that all knowledge—linguistic, social, and cultural—that students bring to the school is valued. All students also experience the esteem and concern of all the teachers. Hornberger (1989) has stressed the importance of valuing what students from different sociolinguistic, educational, and social class backgrounds bring to school with them.

Beyond Language

Duff and Early (1990) demonstrate what can happen when children's sociocultural knowledge base is not taken into consideration. They report that students who transition into mainstream classes may have difficulty both academically and socially because they do not share the cultural knowledge of the mainstream students in their school. The dual-immersion model addresses this issue through its inclusive approach to all cultures represented. Duff and Early noted, "The case study of Oyster Bilingual School demonstrates that schools can collectively organize and construct alternative discourses that position minority students more favorably than mainstream U.S. discourse does . . ." (p. 238).

Yet, despite the apparent success of the dual-immersion approach at Oyster school, Duff and Early (1996) report that some of the students have difficulty maintaining the language and values they have acquired at Oyster when they transition to junior high school. This underscores the need for educational planning that looks at the maintenance not only of two languages but also of an accepting and pluralistic environment throughout schooling.

Majority students are certainly not hampered in their progress in English or in their academic subjects by their pursuit of a second language in school. However, it seems that while these students do gain skills in their second language in DL programs, they do not necessarily gain native-like fluency by the time they graduate, and they do not necessarily gain as much of their second language as their Spanish-speaking peers gain of English. Why this difference is present, and how/whether it can be overcome, is not yet clear, and is a subject for further research.

English Language Development, in a Bilingual Program

The widely accepted view within the English as a Second Language (ESL) research and pedagogical community is that the ideal for all English language learners is to maintain or enrich their native languages while acquiring English as a second language (Eisenstein, Bodman, & Carpenter, 1995; Gass & Neu, 1995; Kasper & Blum-Kulka, 1993). Thus, by definition, a bilingual program in which English is to be learned will include a Second Language Acquisition (SLA) component—often referred to as ESL. Like bilingual education, SLA/ESL are umbrella terms which can refer to a large number of possible educational models including not the more traditional variety of pullout efforts that have SLA/ESL teachers work outside of the regular classroom, and, push-in programs in which SLA/ESL teachers collaborate with regular classroom teachers and work with SLA/ESL students within their regular classes to promote language development, understanding of content and sociocultural insights among all members of the classroom community. SLA/ESL alternatives also include self-contained classrooms that offer content through an ESL approach called sheltered English (Stern, 1992).

When it is not possible to provide bilingual education (including some form of English language development—sometimes referred to as ELD), then SLA/ESL alone is the next best alternative to submersion—the option of offering no special assistance to bilingual students. Multilingual populations, small numbers of learners and/or limited availability of bilingual staff can all contribute to the logistics of such educational decisions. SLA/ESL specialists are trained to promote additive bilingualism and to provide comprehensible input to learners in a supportive environment. It is a mainstay of the SLA/ESL professional to respect linguistic and cultural diversity, and to communicate to all learners that their heritage languages and cultures are treasures to be preserved.

Another aspect of second language theory in schooling contexts worthy of mention is that it has been clear that a second language is best acquired when it is learned through content that is meaningful to learners (Chamot & O'Mally, 1994). This approach has several names including *language through content* and *sheltered English*. In addition, the *task-based syllabus* also promotes meaningful and cognitively challenging second-language experiences (Long & Crookes, 1992). A good example of how such second language teaching can be realized can be found in the CALLA approach (Chamot & O'Mally, 1994).

The compatibility of bilingual education and SLA/ESL is illustrated by Rivera (1999) who describes "El Barrio Popular Education Program as one . . ." including literacy and basic education and Spanish and SLA/ESL (p. 488). In this community-based program, languages (English and Spanish) are each viewed as powerful and relevant for individual development and self-determination. The curriculum involves thematic units that stress issues important in the students' lives. Ovando, Collier, and Combs (2003), in their discussion of the issue of literacy and SLA/ESL, also note that "concerns with ideology and the social distribution of power have had a substantial impact on the fields of language and literacy education." They note that the impact has manifested itself in new ways of theorizing language and literacy development and, in particular, with an increased interest in critical literacy in both mother tongue and English as a second language education. Indeed, the usefulness of first language support in SLA/ESL efforts has also been widely recognized.

Ebsworth and Sanchez (1997) report that in a middle school program, at-risk bilingual students made dramatic gains in language and developed higher educational aspirations in a primarily SLA/ESL program that allowed for first language (L1) use when needed. The knowledge that L1 support was available often encouraged learners to experiment with English. Similar results are reported by Shamash (1990). Many SLA/ESL programs today do allow for a degree of L1 use.

Rather than present SLA/ESL and bilingual education as a dichotomy, it might be more reflective of classroom practice to conceive of both SLA/ESL and bilingual education as promoting additive bilingualism. The degree to which L1 and second language (L2) may be used in this process would involve a range of L1 use for a variety of purposes. The actual demarcation of when an educational approach is purely SLA/ESL as opposed to bilingual (which includes SLA/ESL) may be somewhat similar to the dialect/language issue that programs on the borderline receive their labels as much for political reasons as to reflect actual practice.

Those interested in the instruction of English in academic settings have begun to acknowledge the importance of attending to the form and structure of English. Ellis (1993) comments on the *intake facilitation* role of conscious grammar, which causes "Learners to pay attention to specific formal features in the input and to notice the gap between these features and the ones they typically use in their output" (p. 91). Van Patten and Sanz (1996) discuss the relative merits of explanation as opposed to structured input in instructed Second Language Acquisition. White (1998) identifies a number of variables thought to be involved in the efficacy of attention to form in SLA. These include salience (how easy a form is to notice), explicitness (obvious reference to a form through devices such as statement of rules, or corrective feedback), stage of acquisition of a particular form (from preemergence through target-like use), and relationship of L1 to L2 (similarities and differences in structure). Pienemann's *teachability hypothesis* (first suggested in 1985) matches conscious instruction to the developmental stage of the learner. Lightbown (1998) and Lightbown and Spada (1990) also favor some kind of conscious focus on language features to support acquisition. Furthermore, like the positive results of bilingual education, "Effects of instruction attributable to noticing may not be immediate and may result from the delayed interaction of materials noticed and available for recall (rather than simply detected)" (Long & Robinson, 1998, p. 40).

The separateness of acquisition and learning also has a parallel in the discussion of declarative and procedural knowledge (i.e., information about how language works) and the ability to use language in communicative settings (Anderson, 1983). In the view of McLaughlin (1990) proceduralization (of declarative knowledge) comes about through practice and restructuring. Anderson and Fincham (cited in DeKeyser, 1997) state, "It is too strong to argue that procedural knowledge can never be acquired without a declarative representation" (p. 123).

Developing "Academic" English in U.S. Bilinguals

English *academic* proficiency requires a mastery of a more extensive range of features than *everyday* English. An increasing number of children in the United States come from a non-English background. One of the most important yet difficult aspects of English language development for students from non-English backgrounds, here referred to as bilinguals, is the development of English in academic contexts (Garcia, 2002).

Despite its importance, English academic proficiency of all U.S. students is generally low. Nationally, only 31% of all grade eight students were rated as proficient or higher in the 1998 National Assessment of Academic Progress (NAEP) reading assessment and 24% were rated as proficient or higher in the 1998 NAEP writing assessment. Proficiency levels for Blacks and Hispanics were even lower—only 11% and 14%, respectively, were proficient in reading in 1998 and only 8% and 11%, respectively, were proficient in writing in 1998.

While the research on reading and writing is fairly extensive, research on second language teaching and learning is not. Two National Research Council (NRC) reports (August & Hakuta, 1997; Snow, Burns, & Griffin, 1998) point out the paucity of research on how best to teach English

to bilinguals: "Researchers and educators possess scant empirical guidance on how best to design literacy instruction for such [limited-English-speaking] children in either their primary language or English, much less both" (Snow, Burns, & Griffin, 1998, p. 339). A third NRC report (Meyer & Fienberg, 1992) reviewed methodological shortcomings of prior research studies designed to assess the effectiveness of instructional strategies to teach bilinguals. Together, these research synthesis studies have identified a number of problems with the current research on English language development in schools:

1. Failure of theories and research to take into account "The complexity of issues" (Garcia 2001a, p. 123);
2. Lack of explicit theories and objectives in existing programs that make it difficult to motivate and structure the sensible design of evaluation studies (Meyer & Fienberg, 1992, p. 90);
3. Inability of "School and classroom effectiveness studies to identify particular attributes of programs and their relationship to student outcomes" (August & Hakuta, 1997, p 162);
4. Selection and attrition effects that make it difficult to make meaningful comparisons between studies in different educational programs (Meyer & Fienberg, 1992, pp. 17, 71–73).

The advanced language/literacy skills in reading, writing, speaking, and listening needed to succeed in school are often referred to as *academic* English (Garcia, 2001a; Wong-Fillmore & Snow, 1999; Scarcella, 1999). A variety of models have been proposed to explain the role of academic language proficiency in educational attainment. Some, like Cummins (1981; 1997), have focused on the cognitive load and degree of context students manipulate as they respond to academic tasks. Some have focused on a close analysis of the language used in specific disciplines, considering academic English as a compilation of many subregisters such as the language of mathematics (e.g., Crandall, Dale, Rhodes, & Spanos, 1989). Canale and Swain (1980), in a widely discussed model, proposed four key areas to consider: grammatical competence (encompassing lexical, syntactic, and phonological knowledge in an integrated whole), sociolinguistic knowledge (knowing which lexico-grammatical form to choose given the topic, the social setting, and the interlocutor), discourse competence (knowing how to put sentence-level propositions in sequence to form coherent text) and strategic competence (knowing how to negotiate clarification when lack of competence impedes communication). This model implies that unique aspects of language proficiency are tapped by each knowledge type and gives a broader perspective from which to view academic English.

Although both theory and empirical research suggest that it takes many years for English learners to attain proficiency (Thomas & Collier, 2000), few existing studies have charted this development over an extended period. Most studies tend to target cross-sectional snapshots of student writing or examine development over a short period of time (e.g., Colombi, 2000; Gomez, Parker, & Lara-Alecio, 1996). The few longitudinal studies are usually very small case studies. Sahakian (1997), for example, studied the writing development of four Hong Kong boys from their entry into high school to graduation, exploring the development over time through the analysis of artifacts collected for their writing portfolios at their school. In her case study of four bilingual Hispanic students, Valdes (1996) found that the benefits of intensive ESL instruction and sheltered academic content class are mixed, since they often isolate students from native English-speaking peers and the more rigorous classes necessary to succeed in schools. In a comprehensive meta-analysis of effective reading programs for bilingual students, Slavin and Chueng (2003) conclude that reading programs that utilize the principles of Bilingual Education are the most effective ones.

Policies Generated in Bilingual Education

The U.S. Congress set a minimum standard for the education of language minority students in public educational institutions in its passage of Title VI of the Civil Rights Act of 1964 prohibiting discrimination by educational institutions on the basis of race, color, sex, or national origin and by the subsequent Equal Educational Opportunities Act of 1974 (EEOA). The EEOA provides in part:

> No state shall deny equal educational opportunities to an individual on account of his or her race, color, sex, or national origin, by the failure by an educational agency to take appropriate action to overcome language barriers that impede equal participation by students in its instructional programs. (20 U.S.C. ss 1703 (f))[2]

The Congress of the United States on seven occasions (1968, 1974, 1978, 1984, 1987, 1994, & 2001) has passed specific legislation related to the education of language minority students through The Bilingual Education Act (BEA). Over one billion federal dollars have been appropriated through this legislation for educational activities (program development, program implementation, professional training, and research) for Bilingual Education. A Bilingual Education program was defined as "Instruction given in, and study of English and to the extent necessary to allow a child to progress effectively through the education system, the native language" (Schneider, 1976). Specific changes in policy with regard to these students developed in the re-authorization of 2004. Under the new legislation, existing programs were replaced by new programs and resources that were sent directly to the states for funding of programs to assist in English language development.

Through state legislation, 12 states mandate Bilingual Education services for language minority students, 12 states permit these services, and one state prohibits them. Twenty-six states have no legislation that directly addresses language minority students. As Garcia (2002) notes, states like California (2000), Arizona (2001), and Massachusetts (2003) have passed voter initiated propositions to limit the use of Bilingual Education. Colorado (2003) rejected a similar effort. Needless to say the debate surrounding bilingual education continues at the state level.

What Are the Rights of Language Minority Students?

The 1974 U.S. Supreme Court decision in *Lau v. Nichols* (414 US. 563) is the landmark statement of the rights of language minority students indicating that limited English proficient students must be provided with language support:

> [T]here is no equality of treatment merely by providing students with English instruction. Students without the ability to understand English are effectively foreclosed from any meaningful discourse. Basic English skills are at the very core of what these public schools teach. Imposition of a requirement that, before a child can effectively participate in the education program he must already have acquired those basic skills is to make a mockery of public education.

The Fifth U.S. Circuit Court in *Castañeda v. Pickard (1981)* set three requirements that constitute an appropriate program of Bilingual Education:

1. The theory must be based on a sound educational theory.
2. The program must be "Reasonably calculated to implement effectively" the chosen theory.
3. The program must produce results in reasonable time.

Summary and Conclusion

The previous overviews in this chapter have attempted to highlight important theoretical and related educational practice that serves to provide a broad understanding of issues of importance to the schooling of bilingual students. As indicated previously, the knowledge base continues to expand but is in no way complete. In addition, it would be an error to conclude that the data and theory that have emerged have been primary factors in determining the educational treatment of bilingual students. However, it does seem appropriate to identify possible program, policy, and future research implications derived from research and practice as highlighted by this and previous reviews:

1. One major goal regarding the education of bilingual students should be the development of the full repertoire of linguistic skills in English, in preparation for participation in mainstream classes. Future research should delineate alternative routes that will allow for effective achievement of this *Academic English* goal.
2. Time spent learning the native language is not time lost in developing English. Children can become fluent in a second language without losing the first language, and can maintain the first language without retarding the development of the second language. Presently, it is not clear what processes or mechanisms best facilitate positive transfer. Identifying such processes is a challenge for future researchers.
3. There is no cognitive cost to the development of more than one language in children during the schooling process. Further research that explores specific cognitive/academic functioning of bilingualism is needed.
4. Programs that serve bilingual students should have the flexibility of adjusting to individual and cultural differences among children. Furthermore, educators should recognize that it is not abnormal for some students to need instruction in two languages for relatively long periods of time. We do not yet know how much time in the first language positively or negatively influences academic outcomes in the second language. This type of research will greatly enhance educational outcomes for language minority students.
5. Educators should expect that young children will take several years to learn a second language at a level comparable to that of a native speaker. At the same time, they should not have lower expectations of older learners, who can typically learn languages quite quickly and often end up speaking them just as younger learners. The clear distinction between *young* and *older* learners requires further research.
6. Particularly for children who, on other grounds, are at risk for reading failure, reading should be taught in the native language. Reading skills acquired in the native language will transfer readily and quickly to English, and will result in higher reading achievement in English.

The research, practice, and policy context of bilingual education continues to complicate the fabric of education in the United States. More children are coming to our schools speaking a language other than English. We do have a research and practice base of knowledge that is growing, but not at the magnitude of the need by these students. Moreover, policies at the national and state level

will continue to shape the form of education provided to these students. It is this complex scenario that we must understand as educators meant to serve these students.

List of Key Words and Concepts

Bilingualism, Bilingual Education, Bilingual Education Act (BEA), *Castañeda v. Pickard*, Dual language programs, English language learners (ELLs), Language policy, Language through content, *Lau v. Nichols*, Limited English proficient students (LEPs), Time on task theory, Sheltered English, Task-based syllabus, Teachability hypothesis

Internet Sites Related to Bilingual Education

ERIC Clearinghouse on Urban & Minority Education.: http.www.urbanminority.gwu.edu/
Center for Applied Linguistics: http://www.cal.org/
Language Minority Research Institute: http://www.lmri.ucsb.edu/
National Clearinghouse for English Language Acquisition: http://www.ncela.gwu.edu/

Discussion Questions

1. Define very directly *bilingual education*.
2. What are the parameters of the debate around bilingual education in the United States?
3. Distinguish between federal court-related policy and federal legislative policy regarding the education of language minority students. What are the implications of each for a local school district? Be specific.
4. Discuss the differences between ESL methodologies of instruction and Dual language methodologies of instruction.
5. Compare and contrast the new contexts for educating with the past (contexts) paying particular attention to student populations, different economies, and new pedagogies. Please give specific examples.
6. Describe the attempts to address the cultural diversity in student populations in the last 50 years, from Americanization, to multicultural education, to the new theoretical perspectives. Specifically, how have these new perspectives impacted teaching diverse student populations? Be very specific and give examples.
7. What are the *rights* of language minority students?

Suggested Research Projects

1. Find a family in which more than one language is spoken in the home. Informally interview the family members to get an idea of how the languages are learned by the children. Ask about who speaks what language and the expectations family members have about learning English as well as the other language.
2. To understand the debate issues discussed in this chapter, read the original authors cited in the discussion and form your own arguments with regard to who you think is right.

Suggested Readings

August, D., & Hakuta, K. (997). *Improving schooling for language-minority children: A research agenda.* Washington, DC: National Council Research.

Crawford, J. (2002). *Bilingual education: History, politics, theory, and practice.* Trenton, NJ: Crane.

Freeman, Y. S., & Freeman, D. E. (1998). *ESL/EFL teaching: Principles for success.* Portsmouth, NH: Heineman.

Garcia, E. (2001). *Hispanic education in the United States: Raíces y alas.* Lanham, MD: Rowman and Littlefield Publishers, Inc.

Garcia, E. (2001). *Understanding and meeting the challenge of student diversity* (3rd ed.). Boston, MA: Houghton Mifflin Company.

Garcia, E. (1997). The education of Hispanics in early childhood: Of roots and wings. *Young Children, 6*, 5–14, 1997.

Garcia, E., & McLaughlin, B. (1995). *Meeting the challenges of linguistic and cultural diversity in early childhood.* New York, NY: Teachers College Press.

Gonzalez, J., Brusca-Vega, R., & Yawker, T. (1999). *Assessment and instruction of culturally and linguistically diverse students: From research to practice.* Boston, MA: Allyn and Bacon.

Slavin, R. E. (2003). *Effective reading programs for English language learners: A best evidence analysis*. Baltimore: Center for Research on the Education of Students Placed at Risk. Clearinghouse on Rural Education and Small Schools.

Soto, L. D. (1997). *Language, culture and power: Bilingual families and the struggle for quality education.* Albany, NY: State University of New York Press.

Valdes, G. (1996). *Con respeto: Bridging the distances between culturally diverse families and schools.* New York: Teachers College Press.

Zantella, A. C. (1997). *Growing up bilingual.* New York: Blackwell Press.

References

Anderson, J. (1983). *The architecture of cognition. Cambridge*, MA: Harvard University Press.

Anyon, J. (1995). Race, social class, and educational reform in an inner-city school. *Teachers College Record, 97*(1), 69–94.

Appleton, C. (1983). *Cultural pluralism in education: Theoretical foundations*. New York: Longman.

August, D., & Hakuta, K. (1997). *Improving schooling for language-minority children: research agenda*. Washington, DC: National Council Research.

Baden, B., & Maehr, M. (1986). Conforming culture with culture: A perspective for designing schools for children of diverse sociocultural backgrounds. In R. Feldman (Ed.), *The social psychology of education* (pp. 289–309). Cambridge: Harvard University Press.

Banks, J. (1982). Educating minority youths: An inventory of current theory. *Education and Urban Society*, *15*(1), 88–103.

Banks, C. A. & Banks, J. (1995). Equity pedagogy: An essential component of multicultural educaiton. *Theory into Practice*, *34*(3), 152–158.

Barona, A., & Garcia, E. (1990). *Children at risk: Poverty, minority status and other issues in educational equity*. Washington, DC: National Association of School Psychologists.

Berman, P. (1996). *High performance learning communities: Proposal to the US Department of Education.* Emeryville, CA: Research, Policy, and Practice Associates.

Bernstein, B. (1971). A sociolinguistic approach to socialization with some reference to educability. In B. Bernstein (Ed.), *Class, codes and control: Theoretical studies towards a sociology of language* (pp. 146–171). London: Routledge and Kegan Paul.

Bloom, B. (1984). The search for methods of group instruction as effective as one-to-one tutoring. *Educational Leadership, 41*(8), 4–17.

Boykin, A. W. (1983). The academic performance of Afro-American. In J. T. Spence (Ed.), *Achievement and achievement motives: Psychological and sociological approaches*. San Francisco: W. H. Freeman and Co.

California Tomorrow (1995). The Unfinished Journey: Restructuring Schools in a Diverse Society. San Francisco, CA.

Canale, M., & Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics, 1*(1), 8–24.

Chambers, J., & Parrish, T. (1992). Meeting the challenge of diversity: An evaluation of programs for pupils with limited proficiency in English. Vol. IV, Cost of programs and services for LEP students. Berkeley, CA: BW Associates.

Chamot, A.U., & O'Malley, J.M. (1986). *Cognitive sensitive English instruction*. New York: Lindemann.

Chavez, L (1992). Out of the barrio: Toward a new politics of Hispanic assimilation. New York, NY: Basic Books.

Christian, D. (1994). *Two-way bilingual education: Students learning through two languages*. In The National Center for Research on Cultural Diversity and Second Language Learning: Educational Practice Report 12. Washington D.C.: Center for Applied Linguisitcs.

Christian, D. (1997). *Directory of two-way bilingual*. Washington DC: Center for Applied Linguistics.

Christian, D. (1999). *Two-way bilingual education: Progress on many fronts.* Washington, DC: Center for Applied Linguistics.

Cole, M. (1996). *Cultural psychology: A once and future discipline*. Cambridge, MA: Belknap Press of Harvard University Press.

Collier, V. (1989). How long? A synthesis of research on academic achievement in a second language. *TESOL Quarterly, 23*, 509-531.

Colombi, C. M. (2001). En vías del desarrollo del lenguaje académico en español en hablantes nativos de español en los Estados Unidos. In A. Roca (Ed.), *Spanish in the United States in the new millenium: Linguistic research perspectives* (pp. 296-309). Cambridge/Somerville: Cascadilla Press.

Comer, J. (1986). Home-school relations as they affect the academic success of children. *Education and Urban Society*, *16*, 323–337.

Covington, M. V. (1996). The myth of intensification. *Educational Researcher*, *25*(8), 1–3.

Crandall, J. A., Dale, T. C., Rhodes, N., & Spanos, G. (1989). *English skills for algebra*. Englewood Cliffs, NJ: Prentice Hall Regents/Center for Applied Linguistics.

Crawford, J. (1998). *Ten common fallacies about bilingual education*. Digest for the ERIC Clearinghouse on Languages and Linguistics (Report No. EDO-FL-98-10).

Crawford, J. (1999). *Bilingual education: History, politics, theory and practice (4th ed.)*. Los Angeles: Bilingual Education Services.

Crawford, J. (2000). Language politics in the U.S.A.: The paradox of bilingual education. In C. J. Ovando & P. Mclaren (Eds.), *The politics of multiculturalism and bilingual education: Students and teachers caught in the cross fire* (pp. 106–125). Boston: McGraw-Hill.

Cummins, J. (1979). Linguistic interdependence and the educational development of bilingual children. *Review of Educational Research*, *19*, 222–251.

Cummins, J. (1981). Age on arrival and immigrant second language learning in Canada: A reassessment. *Applied Linguistics.* 2, 132-149.

Cummins, J. (1997). Cultural and linguistic diversity in education: A mainstream issue? *Educational Review, 49*(2), 99-107.

Cummins, J. (1986). Empowering minority students: A framework for intervention. *Harvard Educational Review*, *56*(1), 18–35.

DeKeyser, R. M. (1997). Beyond explicit rule learning: Automatizing second language morphosyntax. *Studies in Second Language Acquisition, 19*, 195-221.

Diaz, S., Moll, L. C., & Mehan, H. (1986). Sociocultural resources in instruction: A context-specific approach. In Bilingual Education Office (Ed.), *Beyond language: Social and cultural factors in schooling language minority students* (pp. 197–230). Los Angeles: Evaluation, Dissemination, and Assessment Center, California State University.

Duff, P., & Early, M. (1996). Problematics of classroom research across sociopolitical contexts. In S. Gass & J. Schachter (Eds.), *Second language classroom research: Issues and opportunities* (pp. 1-30). Hillsdale, NJ: Lawrence Erlbaum.

Duran, R. (1987). Metacognition in second language behavior. In Langer, J. A. (Ed.), *Language, literacy, and culture: Issues of society and schooling* (pp. 49–63). Norwood, NJ: Ablex Corporation.

Ebsworth, T., & Sanchez, C. (1997). *Providing an L2 intellectual challenge through L1 support*. NYS TESOL 27th Annual Conference, Rye Brook, NY, November 23.

Eisenstein, M., Bodman, J., & Carpenter, M. (1995). Crosscultural realizations of greetings in American English. In S. Gass & J. Neu (Eds.), In *Speech acts across cultures* (pp. 89 –108). Berlin: Mouton de Gruyter.

Ellis, R. (1993). The structural syllabus and SLA. *TESOL Quarterly, 27*(1), 91–113.

Freeman, D. C. (1998). *Dual language analyses at Oyster School*. Unpublished dissertation, Georgetown University, Washington DC.

Freire, P. (1970). *Pedagogy of the oppressed*. New York: Seabury Press.

Garcia, E. (1983). *The Mexican-American child: Language, cognition, and socialization.* Tempe: Arizona State University.

Garcia, E. (1994). Addressing the challenges of diversity. In S. L. Kagan & B. Weissbourd (Eds.), *Putting families first* (pp. 243–275). San Francisco: Jossey-Bass.

Garcia, E. (1999) *Student cultural diversity: understanding and meeting the challenge* (2nd ed.). Boston: Houghton Mifflin.

Garcia, E. (2001a). *Hispanic education in the United States: Raíces y alas*. Lanham, MD: Rowman and Littlefield Publishers, Inc.

Garcia, E. (2001b). *Understanding and meeting the challenge of student diversity (3rd ed.)*. Boston, MA: Houghton Mifflin Company.

García, E. E. (2002). Bilingualism in schooling in the United States. *International Journal of the Sociology of Language, 155*(156), 1–92.

Garcia, E., & Gonzalez, R. (1995). Issues in systemic reform for culturally and linguistically diverse students. *Teachers College Record, 96*(3), 418–431.

Garcia, E., & McLaughlin, B. (1995). *Meeting the challenges of linguistic and cultural diversity in early childhood*. New York: Teachers College Press.

Gass, S., and Neu, J. (Eds.). (1995). *Speech acts across cultures*. Berlin: Mouton de Gruyter.

Goldman, S., & Trueba, H. (Eds.) (1987). *Becoming literate in English as a second language: Advances in research and theory*. Norwood, NJ: Ablex Corporation.

Gomez, R. Jr., Parker, R., & Lara-Alecio, R. (1996). Process versus product writing with limited English proficient students. *The Bilingual Research Journal, 20*(2), 209-233.

Grant, C. A. (Ed.). (1999). *Multicultural research: a reflective engagement with race, class, gender and, sexual orientation*. London; Philadelphia, PA: Falmer Press.

Grant, C. A., & Sleeter, C. (1988). Race, class, and gender and abandoned dreams. *Teachers College Record*, *90*(1), 19–40.

Goals 2000: Educate America Act. Pub. No. L. (103-227), 108 Stats. 125 (1994).

Goldman, S., & Trueba, H. (Eds.) (1987). *Becoming literate in English as a second language: Advances in research and theory*. Norwood, NJ: Ablex Corporation.

Gonzalez, G (1990). *Chicano education in the segregation era: 1915–1945*. Philadelphia: The Balch Institute.

Goodman, Y. (1980). The roots of literacy. In M. P. Douglass (Ed.), *Reading: A humanizing experience* (pp. 286–301). Claremont, CA: Claremont Graduate School.

Hakuta, K. (986). *Mirror of language: The debate on bilingualism*. New York: Basic Books.

Hall, N. (1987). *The emergence of literacy*. Portsmouth, NH: Heinemann Educational Books, Inc.

Heath, S. B. (1981). Towards an ethnohistory of writing in American education. In M. Farr-Whitman (Ed.), *Variation in writing: Functional and linguistic cultural differences* (Vol. 1, pp. 225–246). Hillsdale, NJ: Lawrence Erlbaum.

Heath, S. B. (1983). *Ways with words: Language, life, and work in communities and classrooms*. Cambridge, England: Cambridge University Press.

Heath, S. B. (1986). Sociocultural contexts of language development. In California Department of Education, *Beyond language: Social and cultural factors in schooling language minority students* (pp. 143–186). Los Angeles: Evaluation, Dissemination, and Assessment Center, California State University.

Hornberger, N. H. (1989). Continua of biliteracy. *Review of Educational Research, 59*, 271-296.

Improving America's Schools Act, 20, Sec. 6301-8962, (1994).

Kagan, S. (1983). Social orientation among Mexican-American children: A challenge to traditional classroom structures. In E. Garcia (Ed.), *The Mexican-American child*. Tempe: Arizona State University.

Kasper, G. & Blum-Kulka, S. (1993). *Intercultural pragmatics*. New York: Oxford University Press.

Lambert, W. (1990). Culture and language as factors in learning and education. In A. Wolfgang (Ed.). *Education of immigrant students*. Toronto: Ontario Institute for Studies in Education.

Laosa, L. M. (1982). School, occupation, culture and family: The impact of parental schooling on the parent-child relationship. *Journal of Educational Psychology*, *74*(6), 791–827.

Levin, I. (1988). *Accelerated schools for at-risk students*. (CPRE Research Report Series RR-010). New Brunswick, NJ: Rutgers University Center for Policy Research in Education.

Lightbown, P. (1998). The importance of timing in focus on form in grammar. In C. Doughty& J. Williams (eds.), *In focus on form in classroom second language acquisition* (pp. 177–196) Cambridge: Cambridge University Press.

Lightbown, P., & Spada, N. (1990). Focus on form and corrective feedback on communicative language teaching: effects on second language learning. *Studies in Second Language Acquisition, 12*(4), 429–448.

Lindholm, K. (1999). *Two-way bilingual education: Past and future*. Toronto: Presentation at the American Education Research Association.

Lockwood, A.T. (1996). Caring, community and personalization: strategies to combat the Hispanic dropout problem. In *Advances in Hispanic Education*, vol. 1. Washington, D.C.: US Department of Education.

Lockwood, A. T., & Secada, W. (1999). *Transforming education for Hispanic youth: exemplary practices, programs, and schools*. NCBE Resource Collection Series No. 12. National Clearinghouse for Bilingual Education, Washington, DC. 1999-01-00.

Long, M. & Crookes, G. (1992). Three approaches to task-based syllabus design. *TESOL Quarterly, 26*, 27–56.

Long, M., & Robinson, P. (1998). Focus on form: theory, research, and practice. In C. Doughty & J. Williams (Eds.), *Focus on form in the classroom* (pp. 15–41). Cambridge: Cambridge University Press.

McLaughlin, B. (1990). *Restructuring. Applied Linguistics*, 11(2), 113 –128.

McLeod, B. (1996). *School reform and student diversity: Exemplary schooling for language minority students*. Washington, George Washington University: Institute for the Study of Language and Education.

Meyer, M., & Feinberg, S. (1992). Assessing evaluation studies: The case of Bilingual Education strategies. Panel to Review Evaluation Studies of Bilingual Education, Committee on National Statistics, National Research Council. Washington, DC: National Academy Press.

Miramontes, O., Nadeau, A., & Commins, N. (1997). *Linguistic diversity and effective school reform: A process for decision making.* New York, NY: Teachers College Press.

National Center for Education Statistics. 1996). *The condition of education, Vols. 1 and 2*. Washington, DC: United States Department of Education.

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for education reform*. Washington, DC: United States Department of Education.

National Research Council. (1997). *Starting out right: A guide to promoting children's success in reading*. Washington, DC: National Academy Press.

Noguera, P. A. (1999). Confronting the challenge of diversity. *School Administrator, 56*(6), 16–18.

Oakes, J. (1990). *Multiplying inequalities: The effects of race, social class, and tracking on opportunities to learn mathematics and science*. Santa Monica, CA: Rand Corp.

Ogbu, J. (1991). *Cultural models and educational strategies of non-dominant peoples*. New York, NY: City College Workshop Center.

Ogbu, J. (1999). *Collective identity and schooling.* Paper presented at the meeting of the Japan Society of Educational Sociology, Tokyo, Japan.

Ovando, C. J., & Collier, V. P. (1998). *Bilingual and ESL Classrooms: Teaching in Multicultural Contexts (2nd ed.)*. Boston: McGraw-Hill Companies, Inc.

Ovando, C. J., Collier, V. P., & Combs, M. C. (2003). *Bilingual and ESL Classrooms:Teaching in Multicultural Contexts (3rd ed.)*. Boston: McGraw Hill.

Pearl, A. (1991). Democratic education: Myth or reality. In R. Valencia (Ed.), *Chicano school failure and success* (pp. 101–118). New York: Falmer Press.

Pease-Alvarez, L., Garcia, E., & Espinoza, P. (1991). Effective instruction for language minority students: An early childhood case study. *Early Childhood Research Quarterly, 6*(3), 347–363.

Ramirez, M., & Castaneda, A. (1974). *Cultural democracy, bi-cognitive development and education*. New York: Academic Press.

Rivera, K. (1999). Popular research and social transformation: a community-based approach to critical pedagogy. *TESOL Quarterly, 33*(3), 485–500.

Rodriguez, C. E. (1989). *Puerto Ricans born in the U.S.A.* Winchester, MA: Unwin Hyman, Inc.

Rodriguez, R. (1988). *Hunger of memory: The education of Richard Rodriguez*. New York, NY: Bantam Books.

Romo, H. (1999). *Reaching out: Best practices for educating Mexican-origin children and youth*. Charleston, W VA: Clearinghouse on Rural Education and Small Schools.

Romo, H., & Falbo, T. (1996). *Latino high school graduation: Defying the odds.* Austin, TX: University of Texas Press.

Rose, M. (1995). *Possible lives: The promise of public education in America.* New York: Penguin Books.

Rosenshine, B. (1986). Synthesis of research on explicit teaching. *Educational Leadership, 43*(3), 60–69.

Sahakian, P. (1997). *An investigation of how writing in English develops for four Hmong high school boys*. Unpublished dissertation. University of California, Davis.

Scarcella, R. (1999). *Academic English: A conceptual framework*. Santa Barbara, CA: University of California Language Minority Institute.

Schneider, S. G. (1976). *Revolution, reaction or reform: The 1974 bilingual education act*. New York: Las Americas.

Scribner, S., & Cole, M. (1981). *The psychology of literacy*. Cambridge: Harvard University Press.

Shamash, Y. (1990). Learning in translation: beyond language experience. *ESL. Voices, 2*(2), 71–75.

Slavin, R. E. (1989). The pet and the pendulum. Fadism in education and how to stop it. *Phi Delta Kappan*, *70*.

Slavin, R. E. (1995). *Cooperative learning: theory, research, and practice* (2nd ed.). Boston: Allyn and Bacon.

Slavin, R. E. (2003). *Effective reading programs for english language learners: A best evidence analysis.* Baltimore, Maryland: Center for Research on the Education of Students Placed at Risk.

Slavin, R., & Chueng, A. (2003, December). *Effective reading programs for English language learners: A best-evidence synthesis*. Report No. 66, the Center for Research on the Education of Students Placed At Risk (CRESPAR), John Hopkins University. Retrieved from http://www.csos.jhu.edu/crespar/techReports/Report66.pdf.

Slavin, R., Karweit, N., & Madden, N. (1989). *Effective programs for students at risk*. Needham Heights, MA: Allyn and Bacon.

Sleeter, C. (1995). An analysis of the critiques of multicultural education. In J. Banks & C. A. Banks (Eds.), *Handbook of research on multicultural education* (pp. 81–94). New York: MacMillan.

Sleeter, C., & Grant, C. (1999). *Making choices for multicultural education: five approaches to race, class, and gender* (3rd ed.) Upper Saddle River, NJ: Merrill.

Smith, F. (1971). *Understanding reading*. New York: Holt, Rinehart and Winston.

Snow, C. E. (1990). The development of definitional skill. *Journal of Child Language, 17*(3), 697–710.

Snow, C. E., Burns, M. S., & Griffin, P. (1998). Preventing reading difficulties in young children. Washington, D.C.: National Academy of Sciences–National Research Council, Commission on Behavioral and Social Sciences and Education.

Stern, H. H. (1992). *Issues and options in language teaching*. Oxford: Oxford University Press.

Sue, S., & Okazaki, S. (1990). Asian-American educationalachievements: A phenomenon in search of an explanation. *American Psychologist, 45*(8), 913–920.

Tashakkori, A., & Ochoa, S. H. (Eds.). (1999). *Education of Hispanics in the United States: politics, policies, and outcomes*. New York: AMS Press.

Tharp, R. G. & Gallimore, R. (1989). *Challenging cultural minds.* London: Cambridge University Press.

Thomas, W., & Collier, V. (2000). *A National Study of School Effectiveness for Language Minority Students' Long-Term Academic Achievement*. Center for Research on Education, Diversity & Excellence. Final Reports. Paper 1_1_final. Retrieved from http://repositories.cdlib.org/crede/finalrpts/1_1_final.

Trueba, H. T. (1988). Peer socialization among minority students: A high school dropout prevention program. In H. Trueba & C. Delgado-Gaitan (Eds.), *Schools and society: Learning content through culture*. New York: Praeger Publishers.

Trueba, H. T. (1987). *Success or failure? Learning and the language minority student*. Scranton, PA: Harper and Row.

Valdes, G. (1998). The world outside and inside schools: language and immigrant children. *Educational Researcher, 27*(6), 4–18.

Van Patten, B., & Sanz, C. (1996). Explanation versus structured input in processing instruction. Studies in *Second Language Acquisition, 18*(4), 495 –510.

Vogt, L., Jordan, C., & Tharp, R. (1987). Explaining school failure, producing school success: Two cases. *Anthropology and Education Quarterly*, *18*(4), 276–286.

Waggoner, D. (1995). Language information from the 1990 Census. *National Association for Bilingual Education News, 19*(6), 7-8.

Walberg, H. (1986). Synthesis of research on teaching. In M. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 15–32). New York: Macmillan.

Walker, C. L. (1987). Hispanic achievements: Old views and new perspectives. In H. Trueba (Ed.), *Success or Failure? Learning and the language minority student* (pp. 15–32). Cambridge, MA: Newbury House.

Wertsch, J. V. (1985). *Vygotsky and the social formation of the mind*. Cambridge, MA: Harvard University Press.

Wertsch, J. V. (1991). *Voices of the mind: a sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.

White, J. (1998). Getting the learners' attention. In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 85–113). Cambridge: Cambridge University Press.

Wiesner, T. S., Gallimore, R., & Jordan, C. (1988). Unpackaging cultural effects on classroom learning. Native Hawaiian peer assistance and child-generated activity. *Anthropology and Education Quarterly*, *19*(4), 327–353.

Wilson, W. J. (1987). *The truly disadvantaged: The inner city, the underclass, and public policy*. Chicago: University of Chicago Press.

Wong-Fillmore, L. (1991). When learning a second language means losing a first. *Early Childhood Research Quarterly, 6*(3), 323–347.

Wong-Fillmore, L., & Snow, C. (1999). *What educators—especially teachers—need to know about language: The bare minimum*. Santa Barbara, CA: Language Minority Research Institute.

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