Handbook of Bilingualism: Psycholinguistic Approaches

JUDITH F.KROLL
ANNETTE M. B. DE GROOT,
Editors

OXFORD UNIVERSITY PRESS

HANDBOOK OF BILINGUALISM

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OXFORD
UNIVERSITY PRESS

2005

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Oxford University Press, Inc., publishes works that further
Oxford University's objective of excellence
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Kuala Lumpur Madrid Melbourne Mexico City Nairobi
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Published by Oxford University Press, Inc.
198 Madison Avenue, New York, New York 10016

www.oup.com

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Library of Congress Cataloging-in-Publication Data
Handbook of bilingualism : psycholinguistic approaches /
edited by Judith F. Kroll,
Annette M.B. De Groot.
p. cm.
Includes bibliographical references and index.
ISBN-13 978-0-19-515177-0
ISBN 0-19-515177-1
1. Bilingualism—Psychological aspects. 2. Psycholinguistics. I. Kroll, Judith F.
II. Groot, A. M. B. de.

P115.4.H36 2005
404′.2—dc22 2004049595

9 8 7 6 5 4 3 2 1

Printed in the United States of America
on acid-free paper

Preface and Acknowledgments

As recently as 10 years ago, the topic of bilingualism was somewhat outside the mainstream of experimental cognitive psychology. There were many studies on disparate topics, but no systematic body of research that could be identified as constituting a clear focus within the field. In the time since, activity in this field has accelerated at a dizzying pace. There are now journals, a variety of books, international meetings, and cross-disciplinary graduate programs in psychology, linguistics, applied linguistics, and education, all dedicated to second language acquisition and bilingualism. In 1997, we edited a book, *Tutorials in Bilingualism* (Erlbaum), to provide students and researchers with overviews of the topics that we considered central to the emerging psycholinguistics of bilingualism. At the time, we could not possibly anticipate the rapid developments in this field that have occurred.

As we try to understand why interest in cognitive approaches to bilingualism has grown, we can point to the global economy, to the increasing multilingual presence in the United States and elsewhere where monolingualism was once the accepted norm, to debates regarding bilingual education, and to the introduction of exciting new methods for revealing brain activity during language processing. But, what we really believe is the main reason for this increased interest is that cognitive scientists have come to appreciate that learning and using more than one language is a natural circumstance of cognition. Not only does research on second language learning and bilingualism provide crucial evidence regarding the universality of cognitive principles, but it also provides an important tool for revealing constraints within the cognitive architecture.

The chapters in this book represent what we take to be the essence of the new psycholinguistics of bilingualism, one that is informed by developments in linguistics and neuroscience and that builds on the rigor of experimental cognitive science. As in any young field, there are some topics that garner more attention than others and some questions that historically have been underrepresented. It is our hope that the chapters in this volume will satisfy the interest of students who wish to learn about psycholinguistic approaches to bilingualism and at the same time encourage researchers across a range of fields to see that there are still many important questions yet to be answered.

We have had the good fortune of being colleagues and collaborators for 15 years. During this time, we have exchanged ideas and students, we have co-taught a course, visited each other's labs, and shared a special friendship. This book, like our previous edited volume, is a full and equal collaboration between us.

There are many people we wish to thank for their support in the process of compiling this volume. At the top of the list are the contributors; they were generous with their time, patient with us in the process of assembling a handbook of this length, and wrote outstanding reviews of the research in their respective areas. We thank Catharine Carlin, our editor at Oxford, who was extremely encouraging, incredibly patient, responsive to all of our questions; she made us feel throughout that the project was as exciting in the thick of revisions as on the first day it was proposed.

We have been fortunate to work with a wonderful group of students, visitors, and colleagues who spent time in our labs during this period and enriched our lives both professionally and personally. They include Teresa Bajo, Susan Bobb, Susanne Borgwaldt, Kate Cheng, Ingrid Christoffels, Philip Delmaar, Sara Hasson, Noriko Hoshino, Cristina Izura, April Jacobs, Nan Jiang, Rineke Keijzer, Martin van Leerdam, Jared Linck, Lorella Lotto, Pedro Macizo, Erica Michael, Natasha Miller, Maya Misra, Pilar Pinar, Petra Poelmans, Rik Poot, Carmen Ruiz, Mikel Santesteban, Béryl Schulpen, Ana Schwartz, Bianca Sumutka, Gretchen Sunderman, Natasha Tokowicz, Rosanne

van den Brink, Ellen van den Eijnden, and Zofia Wodniecka.

The quality of our intellectual lives has also been supported by a fantastic group of colleagues on both sides of the Atlantic; they made discussions about bilingualism a vibrant source of stimulation that has led to enduring collaborations. We especially thank Dorothee Chwilla, Albert Costa, Ton Dijkstra, Giuli Dussias, Chip Gerfen, David Green, Jan Hulstijn, Wido La Heij, Jaap Murre, Scott Payne, Nuria Sagarra, Janet van Hell, Vincent van Heuven, and Dan Weiss.

Finally, each us of would like to thank some special people in our lives. Judy would like to thank her parents, Ruth Kroll and Sol Kroll, who have always been a source of support; her twin daughters, Nora Kroll-Rosenbaum and Sarah Kroll-Rosenbaum, who know what it means to be on the team and how to make jokes about psycholinguistic models that might never occur to anyone else in the field; her sister Elise Kroll, who is the only real bilingual in the immediate family; and especially David Rosenbaum, her partner of 28 years, who understands that for a couple to have two careers is a bit like having two languages—they are always active to a high level, they compete, and somehow they manage to speak in a single voice that sustains them both. It is to them that she dedicates this effort.

Annette would like to thank her father, Johan de Groot, who at a very respectable age is still closely monitoring the well-being of each member of his large family; her son Jan, just for being the nice young man he is; her sisters Francis de Groot, Monique de Groot, Birgitte van den Elzen, and especially Marion de Groot, who over the years gradually filled the void that was left following the death of Annette's twin sister, Jeannette de Groot. It is to the memory of Jeannette and of her mother, Cher de Groot, that she dedicates this effort.

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PART I

ACQUISITION

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Nick C. Ellis

Introduction to Part I
Acquisition

How we acquire our native language is a question fundamental to humankind. It pervades the long history of our inquiries, yet it is an interesting and difficult enough issue to have escaped a consensual answer to date. Indeed, never has there been so much debate as there currently is concerning the mechanisms of first language (L1) acquisition. Simple arithmetic might suggest that the question of bilingual acquisition, then, would be doubly worthwhile. But the chapters that follow here belie this calculation, with the second language (L2) equals two times the L1 sum falling far short of the real interest mark.

Factors such as language transfer, typological distance and interaction, and the much wider possible ranges of L2 social environments, ages of acquisition, levels of learner cognitive and brain development, motivations, educational environments, and language exposure conspire in multiple factorial interactions to make bilingualism and second language acquisition (SLA) far more complex and fascinating than the mere sum of two first language acquisition (L1A) parts. And, multilingualism is humankind's norm. With perhaps 6,000 languages of the world, far more than the 200 or so countries, an equally rough-and-ready calculation suggests that human beings are more likely than not to be able to speak more than one language.

This part on acquisition provides tutorials on what is currently known about how these diverse factors make SLA so rich and interesting. In what follows here, I briefly introduce these reviews and pull out some of the key themes, generalities, and differences—some summary and sums. A number of the chapters cover areas that reflect traditional boundaries in linguistics: vocabulary, syntax, phonology, grammar, and processing. Others review work done within an approach: the Competition Model, processability theory, or connectionism. Others still focus on factors that moderate the degree to which SLA resembles L1A: age and transfer.

As you read these chapters, bear ever in mind the scope for complexity in SLA and avoid overready generalizations. Despite their likenesses, the sum L1A = SLA is as much an oversimplification as is the assumption of identity even within bilingual acquisition itself: Acquiring two languages from birth (bilingual first language acquisition, BFLA) is quite a different thing from acquiring a second language in later life, BFLA $\neq$ SLA. Moderating variables such as age have differential effects on the degrees to which L1A $\approx$ SLA in phonology, lexicon, syntax, morphology, and pragmatics. Effects that pertain in one representational domain need not apply in another; for example, transfer pervades phonology, but may be more circumscribed in intermediate and higher levels of syntactic generation.

Vocabulary

In chapter 1, De Groot and Van Hell consider the learning of foreign language vocabulary. The starting point of SLA is words and lexicalized phrases, and vocabulary acquisition continues as a constant throughout our experience of language: However proficient we are, most days provide us the experience of new words. The richness of learners' vocabulary is a major determinant of both their communicative efficiency and their understanding of their second language, and vocabulary breadth fuels the acquisition of other language representations too, with a sufficient mass of exemplars providing the database from which the regularities of phonology, morphology, and syntax can be abstracted.

De Groot and Van Hell focus on direct methods of learning vocabulary because a vocabulary of the 3,000 most frequent word families provides around 95% of the coverage of written texts. They review keyword, rote-rehearsal, word association, and

picture association methods for learning foreign language vocabulary, and they evaluate their effects on receptive and productive learning, speed of access, and resistance to forgetting. Words vary on various dimensions, such as their concreteness; their morphological, phonological, and orthographic complexity; their frequency; and their cognate status. De Groot and Van Hell show that all of these factors affect the ease of learning a word and its eventual representation. Concrete words are easier to learn than abstract words, a result of their greater information content, richer representation, and greater opportunity for anchoring and retrieval. Word forms that are phonologically familiar to the learner are easier than those that sound more foreign. These two factors compound in making cognate words particularly easy to learn. De Groot and Van Hell analyze these effects in terms of their implications for the structure of the bilingual lexicon, that is, whether it is compound, coordinate, or subordinate, an issue considered in parts II and III of this volume as it applies to proficient bilingual representation.

Whatever the structure of the bilingual lexicon at fluency, at which point thousands of hours of contextualized L2 vocabulary use have ground direct connections between the L2 forms and their meanings, the evidence here suggests a word association organization of the low-proficiency learner by which the processing of L2 is mediated via the L1. Early L2 vocabulary acquisition is parasitic on L1 phonological representations, L1 conceptual representations, and L1 word-concept mappings; L2–L1 independence only comes as a result of considerable L2 experience.

Syntax

In chapter 2, De Houwer focuses on early bilingual acquisition of morphosyntax. In acquiring two languages from birth with parents who accord to the "one person, one language" principle, a situation referred to as BFLA, do children undergo a double acquisition process in which the two morphosyntactic systems are acquired in parallel as fundamentally independent closed systems (the Separate Development Hypothesis, SDH)? Alternatively, does BFLA produce a single hybrid, a "Mish-Mash" that results from systematic morphosyntactic influence of each language on the other? Research in the 1970s suggested the single-system hypothesis held, with children systematically applying the same syntactic rules to both languages.

De Houwer corrects this misapprehension. She begins with a clear methodological analysis of the types of evidence required to test the SDH, particularly that separate development must be evident for most of the comparable morphosyntactic structures in the child's speech that reflect differences in the input languages. She then reviews the majority of the longitudinal studies published in the last 15 years that have looked at morphosyntactic development in BFLA children. Her analysis of the speech productions of these 29 children between the ages of 1 and nearly 6 years, who together acquired 12 languages in 13 different combinations, showed that no child produced the sort of language repertoire that would be predicted to develop in bilingual children in line with a transfer theory. Young bilingual children reflect the structural possibilities of both languages of exposure and are able to produce utterances that are clearly relatable to each of their different languages; from very early on, the morphosyntactic development of the one language does not have any fundamental effect on the morphosyntactic development of the other.

In general, BFLA children's language-specific development within one language differs little from that of monolingual acquisition, except of course that bilingual children do it for two languages at a time. Equally, like adult bilinguals, young BFLA children are able to switch between languages very easily, either at utterance boundaries or within utterances. De Houwer also claims that there is no evidence that hearing two languages from birth leads to language delay. Empirical confirmation of the SDH entails that young bilingual children are keenly attuned to the specific linguistic environments in which they find themselves.

In chapter 3, MacWhinney considers SLA. In contrast to infant (B)FLA, L2 learners already know a great deal about the world, their brains are committed and entrenched in their L1, and they cannot rely on an intense system of social support from their caregivers. These differences have led some researchers to propose that SLA requires a totally separate understanding from L1A. Yet the many similarities of microprocess in first and second language acquisition and the fact that L2 learning is influenced by transfer from L1 mean that a model of SLA must take into account the acquisition and structure of L1.

For these reasons MacWhinney sketches the plan of a new unified model in which the mechanisms of L1 learning are seen as a subset of the mechanisms of L2 learning. This unified account builds on his earlier Competition Model, which maintains that the

learner's task is to learn the forms of language that serve as the most reliable cues to interpretation—in essence, trying to learn the probability distribution $P_{(\text{interpretation}|\text{cue, context})}$, a mapping from form to meaning conditioned by context, with the different interpretations competing for realization in any particular context according to their cue strength. All language processing can be viewed thus as a set of competitive interactions driven by either auditory and formal cues in comprehension or functional cues in production.

The unified model supports this theory of cue validity by extending it here with additional theoretical constructs for dealing with cue cost and cue support. Cue cost relates to the salience of formal cues, particularly the forms that are not salient to the learner because of their expectations that have developed from their first language experience: These are aspects of learned selective attention resulting from transfer. To acquire these low-salience cues properly, L2 learners can support their implicit learning with additional cognitive mechanisms, such as combinatorial learning, chunking, and use of analogy in the acquisition of new linguistic constructions, mnemonics, and other metalinguistic knowledge and the use of social support strategies.

The unified model incorporates a grounded cognition, functional explanation of grammar as a set of devices that marks the flow of perspective across five cognitive domains: direct perception, space–time deixis, causal action, social roles, and belief systems. In these ways, MacWhinney links research in bilingualism to mainstream cognitive psychology and to cognitive and functional linguistics. All of these areas predict that there will be considerable transfer in SLA: Connectionism predicts it, spreading activation predicts it, the notion of "thinking for speaking" predicts it, and perceptual learning and interference theory predict it. MacWhinney reviews the factors that promote, and those that protect against, language transfer in phonology, lexicon, syntax, morphology, and pragmatics.

Phonology and Bilingualism

In chapter 4, Sebastián-Gallés and Bosch consider bilingual acquisition of phonology. In the first year of life, it is almost guaranteed that monolingual children will acquire the ability to process the sound system of their native language. Yet, when L2 learners later in life try to acquire these same abilities, most of them do not succeed; their speech is betrayed by their nonnative accent; in listening, they often fail to perceive foreign sounds correctly.

Sebastián-Gallés and Bosch consider L1A, BFLA, and adult SLA of the range of systems of phonological representation. At 4.5 months of age, bilingual infants can separate their languages, recognizing when there is a switch from one to the other, even if they are rhythmically very similar. By 6 months old, monolingual infants show maternal language-specific phoneme perception behavior, and their sensitivity to nonnative phonetic contrasts declines during the first year of life.

Thus, acquisition reflects processes of perceptual reorganization that result from linguistic experience, with monolingual children's phonological system becoming perceptually tuned to categorize their native language optimally. For bilingual children, the outcome of these perceptual reorganization processes should result in two sound systems that correspond to the two languages of their experience. It does, but their perceptual learning takes longer: It is only by 14–21 months of age that bilinguals show evidence of categorizing stimuli in each of their two languages as do monolinguals.

If these discrimination capacities of BFLA children are temporarily delayed in comparison to monolinguals, this is nothing compared to the difficulties of second language learners when processing nonnative phonemes. Sebastián-Gallés and Bosch review theories of why is it so difficult to perceive some foreign contrasts and why these difficulties are not "universal," but depend on the first language of the listener: The ease or difficulty with which two phonemes will be discriminated depends on the similarities and differences between L1 and L2 phoneme systems. They then ask these same questions for bilingual acquisition of the perception of stress, phonotactics, and receptive and productive lexicons. The lexical activation studies addressed in this volume in chapters concerning adult bilingual comprehension, production, and control persuasively demonstrate that, even when placed in a totally monolingual mode, phonological input activates both of the bilingual's auditory lexicons. The acquisition and processing of phonology is riddled with transfer effects.

Biological Bases

Chapters 5 and 6 provide a balanced perspective on issues relating to age and critical periods for SLA. It is an incontrovertible fact that ultimate second language attainment is less successful in older than

younger learners. Both chapters agree on this. There is a large body of empirical evidence showing that age of acquisition (AoA) is strongly negatively correlated with ultimate second language proficiency, for grammar as well as for pronunciation. But, close scrutiny of this effect reveals a range of different interpretations, the implications of which are currently under debate in the literature.

In chapter 5, DeKeyser and Larson-Hall present a detailed review of the published results relating AoA and proficiency. These studies have tested speakers of a wide variety of languages and used a wide variety of testing formats and dependent variables, albeit with grammaticality judgments as the most common measure of morphosyntax and global pronunciation ratings the most common index of phonological proficiency. The large majority of these studies demonstrated substantial child–adult differences or strong correlations between AoA and L2 proficiency. L2 learners' performance in morphosyntax varied as a function of age more when grammaticality items were presented in oral rather than written form, and not all areas of the target language grammar were equally susceptible to age effects.

Despite these variations, DeKeyser and Larson-Hall argue that the evidence is doubtful that any person has learned a second language perfectly in adulthood, claiming that four studies showing overlap between adult and native acquirers for morphosyntax can be explained to result from methodological factors, and that the rare observations that some learners can achieve very high levels of nativelike pronunciation are limited to performance on constrained rather than spontaneous production tasks. Their subsequent analysis considers whether the age effect may be caused by confounded variables such as quantity and quality of input, amount of practice, level of motivation, and other social variables differentiating child and adult learners, but they discount the role of these confounds because these variables play a limited role when the effect of AoA is removed statistically; AoA maintains a large and significant role when the social and environmental variables are removed.

Despite their clear conclusion that there is a maturational decline in second language learning capacity during childhood, DeKeyser and Larson-Hall caution that it is important not to overinterpret the implications of this finding for educational practice. The observation that "earlier is better" only applies to certain kinds of naturalistic learning, which schools typically cannot provide. The implication of this research for education is that instruction should be adapted to the age of the learner, not that learners should necessarily be taught at a young age. If early language teaching is needed, it should be based on communicative input and interaction, whereas adolescents and adults need additional focus on form to aid explicit learning mechanisms, which at least some of them can substitute for implicit learning with a satisfactory degree of success.

In chapter 6, Birdsong subjects many of these same studies relating age and SLA to an equally admirable methodological scrutiny. He cautions that there is a constant need to assess independently the effects of length of residence (and consequent amount of L2 exposure) and AoA. But, his major critique concerns not the effect of age per se, but rather whether the reported relationships between AoA and attainment conform to a strict notion of a critical period. The orthodox conception of a critical period hypothesis is that there is a circumscribed developmental period before adulthood during which SLA is essentially guaranteed and after which mastery of an L2 is not attainable. Accordingly, there should be discontinuities in the function relating age and ultimate attainment. In particular, there should be an offset that coincides with the point at which full neurocognitive maturation is reached and after which no further age effects are predicted.

Birdsong's analysis of end-state SLA research reveals little congruence with these geometric and temporal features of critical periods. The geometry of the age function (its slope and any discontinuities), and temporal features of the age function (the points at which AoA begins to, and ceases to, correlate significantly with outcomes) vary from study to study, depending on such factors as the linguistic feature tested, amount of L2 use, and L1-L2 pairing. The general conclusion is that there is no apparent period within which age effects are observed, but rather that they persist indefinitely.

Birdsong also reviews these studies to determine whether there are any cases of nativelike attainment in late bilinguals. He concludes that this is possible in rare but nonnegligible frequencies, and that the 5% or greater incidence of nativelikeness in late bilinguals, which is roughly as predicted from the slope of the age function, is a substantial enough incidence to warrant rejection of a strong critical period hypothesis for SLA.

The Human Language Processor, Grammar, Transfer, and Acquisition

In chapter 7, Pienemann, Di Biase, Håkansson, and Kawaguchi describe processability theory (PT), a psycholinguistic analysis of the human language processor and its operation according to linguistic analyses using lexical-functional grammar, a unification grammar attractive in its typological and psychological plausibility. The basic logic underlying PT is that structural options are produced in the learner's interlanguage only if the necessary processing procedures are available. Language acquisition routes are thus constrained by the architecture of the human language processor because, for linguistic hypotheses to transform into executable processing skills, the processor needs to have the capacity for processing the structures relating to those hypotheses.

PT can be applied cross-linguistically to investigate the nature of the computational mechanisms involved in the processing and acquisition of different L1s. PT can also be used to analyze the interplay between L1 transfer and psycholinguistic constraints on L2 processability: It assumes that the initial state of the L2 does not necessarily equal the final state of the L1 because there is no guarantee that a given L1 structure is processable by the underdeveloped L2 parser. In other words, L1 transfer is constrained by the capacity of the language processor of the L2 learner irrespective of the typological distance between the two languages.

Pienemann et al. present a cross-linguistic survey of L1 transfer effects in SLA and demonstrate (a) that learners of closely related languages do not necessarily transfer grammatical features at the initial state even if these features are contained in both L1 and L2, providing the features are located higher up the processability hierarchy; (b) that such features are transferred when the interlanguage has developed the necessary processing prerequisites; and (c) that typological distance and differences in grammatical marking need not constitute a barrier to learning if the feature to be learned is processable at the given point in time. These findings strongly qualify theories that emphasize extensive L1 transfer at the initial state, and they demonstrate the ways that processability moderates L1 transfer.

Computational Simulation

In chapter 8, Murre reviews computational models of monolingual and bilingual acquisition. As is abundantly clear from the chapters preceding it, the ways by which exposure to tens of hundreds of hours of language input results in the mental representation of language are hugely complex. There are too many variables to hold in mind for a properly considered complete theory. Therefore, language researchers take recourse to computer modeling by which the test of the simulation is whether competences emerge that parallel those of human language learners exposed to similar input. In this way, the debate between deductive and inductive approaches to language acquisition is being rephrased in terms of well-articulated models and real-world data.

Murre reviews computational simulation research into language acquisition using subsymbolic–inductive connectionist approaches. Such research demonstrates that, despite being very noisy and inconsistent, the nature of language input is nevertheless sufficient to support inductive mechanisms by which seemingly rulelike behavior emerges from a data-driven learning process. Examples are given from a variety of language domains (including stress assignment, phonology, past tense formation, localization, and certain aspects of semantics) using a variety of exemplar-based and connectionist architectures (including feedforward networks, simple recurrent networks, Hopfield nets, and Kohonen self-organizing maps for monolingual perceptual and semantic representation and a Self-Organizing Connectionist Model of Bilingual Processing) and a variety of theoretical frameworks (including latent semantic analysis, the Competition Model, the Interactive Activation Model and its bilingual extensions Bilingual Interactive Activation and Bilingual Model of Lexical Access, and the Bilingual Speech Learning Model).

Different aspects of language are best modeled using different architectures, a finding that accords well with the individualities outlined at the beginning of this introduction. Murre concludes that, compared to the thriving field of computational psycholinguistics and the developing subfields of models of language acquisition or models of bilingual processing, there are still very few models of bilingual language acquisition. Murre suggests a number of areas of bilingual acquisition ripe for simulation research.

Summary

As each of these chapters shows, we have come a long way in our understanding of these complex

issues. The most telling insight, which only becomes apparent from the compendium of a handbook like this, is what is seen from the alignment and comparison of what is currently known about these issues when taken together. It is clear that a true understanding can only come from the synthesis of these different questions and approaches. Three themes stand out in my mind in illustration.

The first is the age factor and how it engages aspects of interaction and contexts of acquisition, education, transfer, and brain. Although DeKeyser and Larson-Hall and Birdsong might disagree over continuity/discontinuity in the AoA/SLA end-state function and about the possibility of nativelike attainment in late bilinguals, they are in clear accord that SLA is less successful in older learners. There follows the question of why this should be, a single question that begs considerable further research. What are the brain mechanisms that underpin such loss of plasticity? Are they a function of age or increasing L1 entrenchment? What is the role of linguistic variables in determining the timing and shape features of the age function? What are the cognitive developmental factors relating to these differences, particularly those relating to implicit and explicit learning potential in adults and children? What are the implications for the promotion of multilingualism?

The second is second language processing (Pienemann et al.). We require a psycholinguistically plausible account of grammar, one with processing stages that are clearly specified, and one that can be applied to different languages in a principled way. We need a well-specified theory of the architecture of the human language processor. We need to understand how this processor develops and how new routines are acquired as a result of exposure to the linguistic evidence available from the input. We need to understand language typology and distance. We need to understand the interplay between language transfer and language-specific growth.

The third is transfer itself. These chapters clearly demonstrate linguistic transfer, most reliably regarding the acquisition of L2 phonology (Sebastián-Gallés and Bosch; De Groot and Van Hell), but with examples spanning lexicon, orthography, syntax, and pragmatics. Hence, MacWhinney's general Competition Model dictum that "everything that can transfer will." But, there are situations that also seem to protect against transfer. BFLA seems to promote rapid language-specific morphosyntax acquisition to the standards expected of monolinguals, not some messy Mish-Mash. To what extent is it the FLA aspect of this equation that allows this success or the clear environmental cuing that comes from "one person, one language"? Is the acquisition of two separate syntactic systems really as rapid as the acquisition of just one? If so, why is this true for syntax (De Houwer), whereas the BFLA of phonology is somewhat delayed in comparison to monolingual acquisition (Sebastián-Gallés and Bosch)?

Pienemann et al. similarly provide evidence of lack of transfer in L2 sentence production. Is it the case that transfer has its effects via selective attention, the way learners perceive the L2 input, and the hypotheses they generate about the second language, whereas the processing of the L2 rapidly becomes L2-content driven, with the modularity of the eventual L2 grammar driven by the combinatorial possibilities of L2 lexical forms and constructions and unsullied by cross-linguistic influence? Modular systems are implicit, the sorts of system that are well simulated by connectionist models (Murre). They are automatic in their inhibition of cross-linguistic competitors. How is this selective interference of a multilingual's other languages controlled? Consciousness unites, with the potential to pull together everything we know. To what extent is transfer an implicit learning phenomenon, and to what extent is it determined by explicit learning under attentional control? What are the cues that multilingual individuals use to determine which language is spoken, how are these mentally represented, and how do they function in language processing?

We have to know all of these things. The beginnings of answers to some of these questions are to be found elsewhere in this handbook, but in sum, only some. The further concerted efforts of individuals in cognitive neuroscience, linguistics, psychology, and education are required to fully appreciate the complex nature of bilingualism. It has been claimed that binary variables have properties of all other scales: In a paradoxical way, the two values meet requirements of nominal, ordinal, interval, and ratio scales. The evidence of this part shows that it is less of a stretch to claim that bilingual language acquisition has properties of first language acquisition and much more besides.

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1

The Learning of Foreign Language Vocabulary

ABSTRACT This chapter reviews experimental research into learning foreign language (FL) vocabulary, focusing on direct methods of teaching, such as keyword mnemonics, paired association learning (including rote rehearsal), and picture association learning. We discuss the relative effectiveness of these methods, the constraints in using them, and the way they interact with other factors, most notably the amount of experience a learner has had with learning foreign languages. We review research that shows that some types of words are easier to learn than others and discuss the reasons why this might be so. We also discuss the important role that good phonological skills play in successful FL vocabulary learning and review preliminary research that suggests that background music may be beneficial for some FL learners but detrimental for others. Finally, acknowledging the fact that FL learning via one of the direct methods discussed only provides the starting point for FL word learning, we discuss more advanced stages of the full-fledged learning process.

Learning a language, native or foreign/second,[1] involves the learning of a number of language subsystems, including the language's grammar, phonology, and vocabulary. Although vocabulary is obviously of crucial importance to the language learner, foreign language (FL) teachers as well as FL researchers have until recently treated vocabulary as less central to FL learning than grammar and phonology. (See Boyd Zimmerman, 1997, who provides a historical overview of instruction methods for FL teaching, starting at the end of the 18th century, and explains why vocabulary was often neglected in these methods.) Yet, it has been claimed "that native speakers can better understand ungrammatical utterances with accurate vocabulary than those with accurate grammar and inaccurate vocabulary" (Widdowson, 1978, in Boyd Zimmerman, 1997, p. 13). A corollary of this claim is that the chances of getting one's basic needs fulfilled in an FL environment are substantially larger if the FL learner possesses some well-chosen basic vocabulary in that language than when he or she masters the language's grammar flawlessly, a fact that presumably all FL learners who have tried to make themselves understood in an FL environment are willing to accept (and that is acknowledged by publishers of travel guides, which almost without exception include a carefully selected vocabulary of the language spoken in the country to be visited).

The pivotal role of vocabulary in FL use is also demonstrated in studies that have looked at the relation between FL reading comprehension and FL vocabulary knowledge (e.g., Laufer, 1992, 1997; Nation, 1993). These studies have shown that FL vocabulary knowledge is a good predictor of success in reading in the FL, a finding that echoes the strong relation that has long been known to exist between native language vocabulary knowledge and vocabulary skills (including fast, automatic access of word knowledge in memory) on the one hand and reading in one's native language on the other hand. This relationship has formed the basis of a number of influential models of reading and reading disability (e.g., Perfetti & Roth, 1981; Stanovich, 1980).

The core assumption of these models, supported by a wealth of data, is that fast and automatic

access to the words stored in the reader's mental lexicon is a prerequisite of fluent reading. If word recognition fails (because the word encountered is unknown to the reader or because it is known but cannot be accessed rapidly or automatically), reading comprehension breaks down. The reason is that, in the case of laborious, nonautomatic word recognition, precious attentional capacity (precious because only a limited amount of attentional capacity is available at any moment in time) has to be allocated to figuring out the word and its meaning, leaving too little of the remaining attentional capacity to be allocated to higher level processes, such as finding the antecedent for a pronoun.

On acknowledging the importance of vocabulary knowledge and fast access to and retrieval of this knowledge for fluent FL use, teachers and FL learners appear to face an immense and daunting task. A language contains many tens of thousands of words, far too many to teach and learn via a method of direct teaching. Moreover, for each word, ultimately seven types of information have to be learned: phonological and orthographic, syntactic, morphological, pragmatic, articulatory, idiomatic, and semantic information (Schreuder, 1987).

The majority of these words have multiple meanings. It has been suggested that the number of meanings per word amounts to 15 to 20, none of which—contrary to what is often thought—can be singled out as the word's "basic" or "real" meaning (Fries, 1945, in Boyd Zimmerman, 1997). Add to this the fact that word meanings are not stable but instead, just as a language's phonology, develop gradually over time (see Pavlenko, chapter 21, this volume), and it can easily be imagined that the teaching and learning of a full-fledged FL vocabulary is an impossible task that may discourage both teachers and learners of FL and direct their efforts to more manageable components of FL knowledge instead.

However, several studies indicated that familiarity with a relatively small, carefully selected, number of words suffices for adult language comprehension (Laufer, 1992; Nation, 1993; see Hazenberg & Hulstijn, 1996, for a review). Nation argued that a vocabulary of the 3,000 most frequent word families (about 5,000 lexical items; but see Bogaards, 2001) provides around 95% coverage of written texts in English, which should enable an adequate level of comprehension of these texts (but see Hazenberg & Hulstijn, 1996). This point of view has clear implications for FL learning: If the FL learner needs to attain an initial vocabulary of "only" a few thousand words, direct (explicit) vocabulary instruction becomes a feasible means of instruction. The remaining vocabulary can subsequently be learned implicitly, similar to the way native speakers and early bilinguals acquire vocabulary from an early age (e.g., Ellis, 1995) and through extensive reading in the FL.

This chapter focuses on research that has employed direct methods of FL vocabulary teaching (or, from the learner's viewpoint, on direct methods of FL vocabulary *learning*) in (primarily) experimental settings. The first section discusses the various methods used and their effectiveness and constraints. The next two sections focus on the differential learning effects that have been obtained with different types of words. A description of these word-type effects precedes a discussion of plausible theoretical explanations of their occurrence.

A considerable amount of recent research points at the importance of good phonological skills in vocabulary learning. This work constitutes the topic discussed in the next part of this chapter. It is followed by a section that shows that much more is involved in FL vocabulary learning than just storing the FL word's name in memory. The final two sections discuss, first, a topic of obvious pedagogical importance, namely, the beneficial or detrimental effects that background music may have on FL vocabulary learning and, second, a number of the causes of the large differences in FL vocabulary learning outcomes and learning ability that exist across studies and between groups of FL learners and individual FL learners.

Direct Methods of Learning Foreign Language Vocabulary

Keyword Mnemonics

A well-known, imagery-based instruction method for the learning of novel vocabulary, including FL vocabulary, is the keyword method. The keyword method is a mnemonic technique in which learning is divided into two steps. In the first step, one learns to associate the novel word (e.g., *mariposa*) to a keyword (e.g., *marinade*). A keyword is a word in the native language that looks or sounds like the novel word that must be learned. In the second step, the learner creates a mental image in which both the keyword and the first language (L1) translation (here "butterfly") of the novel word interact (e.g., a butterfly swimming in the marinade). The keyword mnemonic thus establishes

both a form and a semantic connection (by means of the interactive image) between the novel word and its L1 translation. After learning, presentation of the novel FL word will elicit the keyword, which in turn will evoke the interactive image between the keyword and the novel word, after which the learner can produce the L1 translation.

The keyword method may seem a rather laborious procedure for learning FL vocabulary. Many studies have found, however, that the keyword method facilitates foreign vocabulary learning and enhances recall in comparison to rote rehearsal (in which the novel word and its L1 translation are subvocally repeated) and unstructured learning (in which learners may choose their own strategy; for reviews, see Cohen, 1987; Hulstijn, 1997; Pressley, Levin, & Delaney, 1982). Beneficial effects of the keyword method on learning and immediate recall of FL vocabulary have been obtained in a wide variety of languages, including Chinese (Wang & Thomas, 1992), English (Elhelou, 1994; Rodríguez & Sadoski, 2000), German (e.g., Desrochers, Wieland, & Coté, 1991), Russian (Atkinson & Raugh, 1975), and Tagalog (e.g., Wang, Thomas, & Ouellette, 1992).

The keyword method has been successful in a wide variety of settings, including laboratory experiments (as in Atkinson & Raugh, 1975) and studies in more natural settings, often a classroom (Levin, Pressley, McCormick, Miller, & Shriberg, 1979; Rodríguez & Sadoski, 2000). The method benefited FL vocabulary learning and recall of learners of various ages, ranging from children (e.g., Elhelou, 1994; Pressley, Levin, & Miller, 1981) to elderly learners (Gruneberg & Pascoe, 1996).

The keyword method's success can be illustrated by the classical study of Atkinson and Raugh (1975), which instigated a wealth of studies on keyword mnemonics. These authors had university students learn 120 Russian words on three consecutive days (40 words a day). The learners, all native speakers of English with no prior knowledge of Russian, received instructions to follow the keyword method or were instructed to use any learning method they wished. Atkinson and Raugh found that keyword learners outperformed the own-strategy learners on all recall tests.

A second striking example concerns a study by Beaton, Gruneberg, and Ellis (1995), who studied the 10-year retention of a FL vocabulary of 350 words learned by a 47-year-old university lecturer via the Linkword Italian course. In this course, subsequently published by Gruneberg (1987, in Beaton et al., 1995), the keyword method of vocabulary learning is integrated with basic grammar. After 10 years, without any use of Italian, this person remembered 35% of the previously learned FL vocabulary, and after 10 minutes of relearning, added an additional 93 words to the list of recalled words. Although the learner's performance in acquiring Italian could have been facilitated by his knowledge of other languages, including French, Spanish, German, and Greek, and long-term retention with other instruction methods has not been evaluated, the amount of vocabulary retained after so long is still remarkable.

Theoretical explanations of the benefits of the keyword method point toward an important role of imagery. According to the dual-coding theory of Paivio and colleagues (e.g., Paivio, 1986; Paivio & Desrochers, 1981), the keyword method enhances learning and recall because the method uses both the verbal system and the image system in human memory. During learning, both a verbal and an image code are encoded in memory. Assuming that these codes have additive effects, retrieval of the FL word is facilitated because there are two memory codes for the learning event, either of which can support recall. An alternative explanation was proposed by Marschark and his colleagues, who suggested that imaginal processing facilitates recall by increasing the relative relational value and distinctiveness of the information generated during learning (Marschark, Richman, Yuille, & Hunt, 1987; Marschark & Surian, 1989).

Although many studies reported positive effects of the use of keyword mnemonics in FL vocabulary learning, the findings of other studies suggested that the method may not be effective under all conditions. Questions that have been raised pertain to the long-term benefits of the keyword method and intentional versus incidental learning conditions, its usefulness for certain word types, the effects on retrieval speed, the benefits for experienced learners, and its usefulness for receptive and productive learning and recall. These findings potentially constrain and qualify the general applicability of this method. We discuss each of these topics next.

Durability of Memory Traces In the majority of studies reporting long-term benefits of the keyword method, the delay interval between learning and testing is typically manipulated within subjects: Each subject is tested both on the immediate test and on subsequent delayed tests. In a series of studies, Wang and Thomas questioned the viability of this approach for measuring long-term effects of

the keyword method because the immediate test potentially provides an additional learning trial or allows testing the adequacy of retrieval paths (Wang & Thomas, 1992, 1995; Wang, Thomas, & Ouellette, 1992). They examined the long-term effectiveness of the keyword method by treating the delay interval as a between-subjects variable, testing some learners immediately after study and others only after a delay of several days. Their manipulation also changed the learning set from intentional learning instructions (in which the learners know in advance that their newly acquired knowledge will be tested after learning) to incidental learning instructions. Wang and Thomas convincingly showed that, under these conditions, long-term forgetting is greater for keyword learners than for rote learners (Wang et al., 1992; Wang & Thomas, 1992, 1995; but see Gruneberg, 1998). The poorer retention for keyword learners observed by Wang and Thomas may have surfaced because of the between-subjects manipulation, which prevented additional learning or retrieval rehearsal on the immediate test.

The Role of Word Type A second potential constraint on the applicability of the keyword method concerns the diversity of the words presented in these studies. In most keyword studies, the FL vocabulary items are concrete words, referring to easily imaginable concepts. This sample of words does not represent adult vocabulary knowledge and language usage faithfully. Moreover, the exclusive use of concrete words may have overestimated the merits of the keyword method: Creating an interactive image between the keyword and the L1 equivalent of the novel FL word, a crucial step in the keyword method, is likely to be easier for concrete words (e.g., *butterfly*) than for abstract words (e.g., *duty*). Ellis (1995) even conjectured that the keyword method would be of little use in learning abstract vocabulary.

However, the few studies that explicitly tested the applicability of the keyword method to words that varied in imageability or concreteness did not seem to substantiate this idea (Delaney, 1978; Pressley et al., 1981; Van Hell & Candia Mahn, 1997; cf. Ellis & Beaton, 1993a). For example, Van Hell and Candia Mahn presented abstract and concrete FL words to keyword learners and rote learners. They found that concrete words were learned and remembered better than abstract words under rote rehearsal instructions (as is commonly found; see the word-type effects discussed in the next part of this section). However, the advantage of concrete words over abstract words was not notably larger under keyword instructions.

Another type of FL words that may be less suitable for learning via the keyword method is cognates. Remember that the keyword is an L1 word that looks or sounds like the to-be-learned FL word. In learning cognates, for instance, for the Spanish word *rosa*, the most obvious keyword would be its translation, here *rose*. The keyword method thus seems an unnecessarily laborious and ineffective method for learning cognates, particularly considering the large advantage that cognates have over noncognates in the more straightforward learning methods of word association and picture association learning (see the detailed discussion of the role of word type in FL vocabulary learning).

Retrieval Speed In the keyword literature, the benefits of learning are typically expressed in terms of the percentage or proportion of correctly recalled words, often measured in a cued recall task. In the cued recall task, one of the elements in a pair (the cue) is presented during testing, and the participant is asked to come up with the other element of the pair. In the cross-language variant of the cued recall task, as frequently applied in FL vocabulary learning studies, the cue is a word in one language, and the element to come up with is its translation in the other language; the cross-language version of the cued recall task is thus essentially a word translation task. The cued recall retrieval measure expressed as percentage of correctly recalled words is assumed to reflect the items successfully encoded in long-term memory during learning. However, as discussed in this chapter, fluent language use is determined not only by retrieval accuracy, but also by the speed with which a word can be retrieved from memory. Nearly three decades ago, Atkinson (1975) raised a similar point. He assumed that FL learning via the keyword method would not slow subsequent retrieval of the learned FL words as compared to methods in which word retrieval is less complex, like rote rehearsal.

Remarkably few studies, however, have examined the effect of keyword instruction on FL word retrieval speed (see Van Hell & Candia Mahn, 1997, and Wang & Thomas, 1999, for exceptions). In two experiments, Van Hell and Candia Mahn examined retrieval speed by comparing retrieval times of keyword and rote learners for newly learned FL words in a timed cued recall task. Performance was assessed in three tests: immediately after the learning phase, after a 1-week delay, and after a 2-week delay. In all tests, they observed

considerably shorter retrieval times for rote learners than for keyword learners (with the differences ranging between 452 and 966 ms). The faster retrieval times for rote learners were not compromised by poor recall performance. Rather, the proportion of correctly recalled words of rote learners was higher than (Experiment 1) or equal to (Experiment 2) that of the keyword learners. Wang and Thomas (1999) corroborated these results by measuring response times via a timed recognition task (treating the delay interval as a between-subjects factor).

Together, these findings showed that keyword learners need more time to retrieve the newly learned words from memory than rote learners do, suggesting that the retrieval of newly learned words may be slowed by the use of keyword mnemonics. Moreover, it appears that the keyword does not become superfluous, but is still used as a retrieval cue well after learning (cf. Atkinson, 1975). This may impede an important goal of FL learning, namely, the attainment of verbal fluency.

The Role of Experience in Foreign Language Learning A fourth factor that may constrain the applicability and suitability of the keyword method concerns the learner's amount of FL learning experience. In the majority of keyword studies, the participants were inexperienced FL learners. Studies using more advanced learners suggested that these learners may benefit less from keyword mnemonics than inexperienced learners do. Levin et al. (1979), Moore and Surber (1992), and Hogben and Lawson (1994) used learners who had followed FL classes for at least a year and observed that the typical beneficial effects of keyword mnemonics were less robust with more advanced learners of the target language. These findings were extended by Van Hell and Candia Mahn (1997) to another group of experienced learners, namely, multilingual language users with a considerable amount of experience in learning FL vocabulary (i.e., in English, French, and German), but who had no prior knowledge of the target language, Spanish. In these learners, keyword instructions were less effective than rote rehearsal instructions in both immediate and delayed recall.

These studies suggested that keyword mnemonics are relatively ineffective in experienced FL learners, both advanced learners of the target language and inexperienced learners of the target language who had experience with learning a number of other FLs. Apparently, there is no single most effective way of FL vocabulary learning, but a particular type of learner benefits most from a particular learning method. (Another experimental result that substantiates this claim is presented in the section The Effect of Background Music on Learning Foreign Language Vocabulary.)

Direction of Testing Another factor that may qualify the benefits of the keyword method concerns the direction of recall. Most keyword studies have used a "receptive" cued recall task in which the newly learned FL word is presented and the L1 translation must be produced; this task corresponds to "backward" word translation (see, e.g., De Groot, Dannenburg, & Van Hell, 1994). The reverse task, "productive" cued recall (or "forward" translation), is used less frequently. Ellis and Beaton (1993a) found that keyword mnemonics are effective for receptive recall, but less so than rote rehearsal instructions for productive recall.

In conclusion, numerous studies reported the beneficial effect of using keyword mnemonics in FL vocabulary learning. Yet, a drawback of the method is that it seems to impede word retrieval after learning, and that its success is constrained by a number of factors, including the learners' experience with FL learning and the type of words to be learned. One of the learning methods discussed in the next section, the word association method, does not suffer from these constraints.

Paired Associate Learning

Two other common methods used in FL vocabulary learning studies are versions of a general learning method that has been used in verbal learning and memory research for decades, namely, the so-called paired associate paradigm. In studies employing this method, pairs of stimuli are presented during learning. At testing, the cued recall task is often employed; one of the elements in a pair (the cue) is presented, and the participant is asked to come up with the second element of the pair. Alternatively, whole pairs are presented at testing that were or were not presented as such during learning, and the participants are asked to indicate whether the presented stimulus pair is "old" (presented during learning) or "new" (not presented during learning; "recognition"). The stimuli as complete pairs, and the separate elements within a pair, may vary on many dimensions, such as the modality of presentation (e.g., auditory or visual) and the nature of the stimuli. Line drawings of

common objects or the objects themselves, nonsense shapes, words of various grammatical categories, nonsense combinations of letters, single letters, numerals, and, indeed, foreign words have been used as stimulus materials in paired associate studies (see Runquist, 1966, for an early description of the essentials of the method).

The two versions of this general paradigm that have often been used in FL vocabulary learning research are the word association and picture association methods. In the word association method, the paired associates presented during learning are two words, one a native language word and the second its translation in the target FL. The FL words to be learned may be actual words in a natural language or invented, artificial words that do not occur as such in any natural language. In the latter case, the FL word to be learned may be a letter sequence that is formed according to the orthographic and phonological systems of the learner's native language but that carries no meaning (a "pseudoword") or an orthographically or phonologically "illegal" letter string that does not follow the orthographic or phonological rule systems of the learner's native language (a "nonword"). In the picture association method, one of the elements in the study pairs is the targeted FL word and the second is a picture (or a line drawing) depicting the referent of this word. Typically, in both these methods the words are presented visually, but in word association (and for the FL words in the picture association condition), auditory presentation is a feasible alternative as well and may indeed sometimes be the only option (when the learners are illiterate).

The term *word association method* is used here to stress the fact that, in this method, two words are paired in each learning trial. The term is neutral with respect to the exact learning strategy the participants actually use. Often, no specific instructions regarding which strategy to adopt are given to the participants, a learning setting that is also referred to as *unstructured learning*. Under these circumstances, learners report the use of various learning strategies (e.g., associating the two words in the pair; rehearsing them silently; detecting similarities between the words in a pair; forming mental images of the words; constructing sentences containing the words in the pair; inventing memory aids; De Groot & Van den Brink, 2004); different participants in the same experiment may use different strategies, but individual participants may also replace a strategy employed early in the learning episode with a new strategy. In other studies, the instructions are somewhat more specific. For instance, in studies employing the rote learning technique, the participants are instructed to rehearse and memorize the presented materials silently (this is how the term was employed above).[2]

Of the two paired associate learning methods, the word association technique can be applied more widely than the picture–word association method. As pointed out, the success and applicability of the keyword method, although effective in many circumstances, is constrained by a number of factors. One of these is the fact that the method is not optimally suited for the learning of abstract words and is unsuitable for learning cognates. The picture association technique suffers from one of these constraints as well and to an even larger extent than the keyword method: Whereas with some effort it is possible to employ the keyword method in learning abstract words (Van Hell & Candia Mahn, 1997), it is virtually impossible to depict abstract words, which by definition cannot be experienced by the senses, including the eye. (Unlike the keyword method, there is no restriction to limit the picture association method to noncognates.)

The word association method does not suffer from any of these constraints; it can be used, and indeed has been used, to study the learning of concrete and abstract words and cognates and noncognates (and frequent and infrequent words, but this variable also does not constitute a constraint for the picture association and keyword methods). The pertinent studies and the effects found are discussed in the section on word type effects.

Why then, if its applicability is restricted to the study of only a subset of words in a language, is the picture association method used at all? An important reason presumably is that it lends itself rather naturally to study vocabulary learning in young children because the method closely resembles a common form of L1 vocabulary acquisition in these children, namely, the association of a word with the corresponding object in the child's environment. Experimental data collected by Wimer and Lambert (1959) suggested that this association of the to-be-learned FL word with environmental objects and events is a relatively effective FL vocabulary learning method for adult learners as well, but a more recent study (Lotto & De Groot, 1998) refuted this claim (see the section Individual Differences in Learning Foreign Language Vocabulary for details).

When the picture–word association method is used with very young children, it can only be exploited in an auditory form (presenting a picture

with the spoken form of its FL name) because these children will typically still be illiterate. Whereas visual presentation of the FL word is an option for young children who have just passed the very initial stages of learning to read, it is not a recommended mode of presentation for this learner group either. The reason is that, for these children, word reading has not been automatized yet and therefore coming up with the correct sound structure of the visually presented words (via the written forms) often constitutes a real challenge to them. This cognitive limitation cannot be ignored in studies of vocabulary acquisition because it is a well-established fact that generating the phonological forms of visually presented words by means of overt or subvocal speech is an essential component of successful vocabulary acquisition (see The Role of Phonology in Foreign Language Vocabulary Learning section).

Learning Words in Context

In the FL vocabulary learning methods discussed above (i.e., keyword learning, rote rehearsal, word association learning, and picture association learning), the newly learned words are presented in highly impoverished contexts. Language users, including FL learners, typically perform in contextually richer situations. This evokes the idea that an FL word may be better learned in a larger, more meaningful linguistic context like a sentence. In the field of FL vocabulary learning studies using direct instruction methods, the question whether such learning is more effective using restrictive contexts, as in the studies discussed above, or using a larger linguistic context has received relatively little empirical attention (but see, e.g., Moore & Surber, 1992; Prince, 1996). One prerequisite of learning FL vocabulary in an FL sentence context is that the FL learners have a basic level knowledge of the FL language that should be at least sufficient to understand the sentence context.

Prince (1996) examined more advanced FL learners who had studied the FL (English) for 5 to 8 years and instructed them to learn new FL words in either a sentence context condition or a word association condition. He found that more words were recalled with word association than with sentence context instructions. It should be noted, however, that recall of the relatively weak learners (but not of the more advanced learners) in the word association condition was notably poorer when measured via a sentence completion task than via a cued recall task. This finding suggests that FL learners may differ in the extent to which they can successfully transfer new vocabulary learned via contextually restricted methods (here via word association) to more meaningful and contextually richer FL situations.

Word-Type Effects

Word-Type Effects on Learning

Words vary on a number of dimensions. For instance, words may refer to concrete objects or to abstract entities (the variable concreteness); they may share (a large part of their) visual or auditory form with their translation in another language (cognate status); they may be used often or rather sparsely in speech and writing (frequency); they may be morphologically simple or complex (morphological complexity) or may differ in structural complexity for other reasons (e.g., they may contain more or less-complex consonant clusters).

The effect of some of these variables, most notably concreteness, cognate status, and word frequency, has been studied frequently in bilingual representation studies, which focus on the way translation pairs are represented in bilingual memory (e.g., as ''compound,'' ''coordinate,'' or ''subordinate'' structures in the words of Weinreich, 1953/1974, or as ''word-association'' or ''concept-mediation'' structures in the terminology of Potter, So, Von Eckardt, and Feldman, 1984; see De Groot, 1993; Kroll, 1993; and Kroll & Tokowicz, chapter 26, this volume, for reviews). The tasks most commonly employed in these studies are word translation (e.g., De Groot et al., 1994), word association (e.g., Kolers, 1963; Van Hell & De Groot, 1998a), and semantic priming across languages (e.g., De Groot & Nas, 1991; Keatley, Spinks, & De Gelder, 1994).

In contrast to the bilingual representation studies, relatively few FL vocabulary learning studies have manipulated word-type variables, even though doing so is likely to provide relevant information on the learning process and the ensuing memory representations. Furthermore, results of such studies may inform FL curricula, especially the sequencing of the vocabulary to be learned by the students (e.g., Meara, 1993).

A plausible reason why only a few of these learning studies varied word type is that typically the word set presented for learning in these studies consisted of rather few words, too few to contain a

sufficiently large number of each type (e.g., concrete noncognates) to obtain reliable effects of the variables concerned. For instance, studies by Cheung (1996), Papagno, Valentine, and Baddeley (1991), and Wimer and Lambert (1959) presented only three, eight, and nine words, respectively, for which an FL word was to be learned.

As the representation studies, the few FL vocabulary learning studies that manipulated word type showed reliable effects of two of the above variables: word concreteness (De Groot & Keijzer, 2000; De Groot & Van den Brink, 2004; Ellis & Beaton, 1993b; Service & Craik, 1993; Van Hell & Candia Mahn, 1997) and cognate status (De Groot & Keijzer, 2000; Ellis & Beaton, 1993b; Kroll, Michael, & Sankaranarayanan, 1998; Lotto & De Groot, 1998). For some of these studies, namely, those that have employed an orthogonal (not a correlational) design, it is possible to determine the actual size of the effects. These analyses show that the effects are substantial: Across the relevant studies, the magnitude of the concreteness effects varies between 11% and 27%, meaning that the recall scores are from 11% to 27% higher for concrete words than for abstract words (De Groot & Keijzer, 2000; De Groot & Van den Brink, 2004; Van Hell & Candia Mahn, 1997). Similarly, the magnitude of the effect of cognate status varies between 15% and 19% when highly experienced FL learners were the participants in the vocabulary learning studies (De Groot & Keijzer, 2000; Lotto & De Groot, 1998). When less-experienced FL learners served as participants, the cognate effect even appears to be substantially larger (about 25% in a receptive testing condition and about 50% in a productive testing condition; Kroll et al., 1998, p. 383).

Acknowledging the fact that fluent use of a FL not only requires that FL knowledge (here, the knowledge of FL vocabulary) is stored in memory, but also that this knowledge is accessed and retrieved rapidly (see also the section on keyword mnemonics), the five studies that employed an orthogonal design measured retrieval times as well. The results of these analyses generally converged with the analyses on the recall scores, although fewer of the effects were statistically significant. But, whenever a significant effect occurred, its direction strengthened the conclusions drawn from the analyses of the recall scores. That is, responses to concrete words and cognates were generally faster than those to abstract words and noncognates, respectively.

A third variable that has been manipulated in some of the above studies is word frequency. Compared to the effects of word concreteness and cognate status, the effect of this variable is not robust. If it occurs at all in a particular study, it is rather small (effects of 3% to 7% in De Groot & Keijzer, 2000; De Groot & Van den Brink, 2004; and Lotto & De Groot, 1998), and in two of these studies (De Groot & Keijzer, 2000; De Groot & Van den Brink, 2004), this small effect (with better performance for high-frequency words than for low-frequency words) was attributable to a subset of the items only.

The FL vocabulary learning studies discussed in this section employed different methods of FL learning. As mentioned, Van Hell and Candia Mahn (1997) contrasted the keyword method and rote rehearsal; De Groot and Keijzer (2000) and De Groot and Van den Brink (2004) used the word association technique; and Kroll et al. (1998) and Lotto and De Groot (1998) contrasted the word association and picture association methods. Maybe the most noteworthy word-type effect reported in these studies combined is the finding by Kroll et al. and Lotto and De Groot that an effect of cognate status not only materialized in the word association condition, but also in the picture association condition. What is more, the cognate effect was equally large in these two conditions. The reason to qualify this finding as noteworthy is that it is generally assumed that the form relation between translation equivalent terms underlies the effects of cognate status in both representation and learning studies. But of course, a word and a picture representing this word do not share any form similarity.

The effect of cognate status in the picture-learning condition thus suggested that the presentation of a picture activates the corresponding L1 word form (Lotto & De Groot, 1998, pp. 58–59), and that the learner then recognizes the similarity between the generated L1 word form and the to-be-learned FL word form accompanying the picture. This awareness then somehow (see the section Cognate Status for more detail) facilitates the learning of the new form. In theory, the form concerned could be phonological, orthographic, or both because the two elements within the cognate pairs used in these studies are typically similar both in spelling and in phonology, and the learner's recognition of either type of relationship might facilitate learning. Lotto and De Groot, however, argued that the forms involved presumably are the phonological forms (see the original reference for details). Furthermore, they noted that such a conclusion fits in nicely with the results of a number of related studies that all suggested an important role for phonology

in learning FL vocabulary, even when the learning materials are presented visually (e.g., Baddeley, Papagno, & Vallar, 1988; Papagno et al., 1991; Van Hell & Candia Mahn, 1997; see The Role of Phonology in Foreign Language Vocabulary Learning section for a more detailed discussion).

Word-Type Dependent Forgetting

The goal of FL vocabulary learning is to install durable, not transient, representations in memory. At least two studies suggested that this goal is not met equally often for all types of words, but that instead more forgetting occurs for the types of words that are the most difficult to learn (De Groot & Keijzer, 2000; De Groot & Van den Brink, 2004). When the participants of these studies where retested about a week after initial learning (without further learning), it turned out that more forgetting had occurred for abstract words than for concrete words, and that more forgetting had occurred for noncognates than for cognates. These results converged with the findings of Bahrick and Phelps (1987), who showed (at a global level, without examining the performance for different types of words) that, 8 years after learning, retention was best for words that had required the fewest learning trials to obtain criterion performance during learning.

Note that this does not imply that manipulations that increase the difficulty of a learning task lead to more forgetting. In a FL vocabulary learning study using the word association method, Schneider, Healy, and Bourne (2002) found that increasing the difficulty of learning during the initial phase (i.e., through learning procedures involving the more difficult L1-FL direction rather than the reverse direction, mixing rather than blocking semantic categories, or no pretraining of FL words) leads to poorer learning and immediate retention, but not to inferior delayed retention, transfer, and relearning. Importantly, in Schneider et al.'s study, the difficulty of the learning conditions pertained to the difficulty of learning procedures rather than of the FL materials to be learned, as in the work of De Groot and Keijzer (2000) and De Groot and Van den Brink (2004). In other words, concrete words and cognates may be better retained than abstract words and noncognates, respectively, but FL words learned under difficult learning procedures may be better retained than those same words when learned under easy learning conditions.

Explaining the Word-Type Effects

Concreteness

Effects of concreteness are ubiquitous in studies on first and second/foreign language learning and language processing. For instance, the concreteness effect observed in the FL vocabulary learning studies discussed above has a parallel in L1 acquisition, in which concrete words are acquired earlier than abstract words (e.g., Brown, 1957; Schwanenflugel, 1991). The questions remain what causes these effects and whether all effects of this variable, both in L1 acquisition and in FL learning and both in language acquisition/learning and in language processing, can be parsimoniously attributed to the same source or whether different causes underlie the various manifestations of the effect.

For instance, a likely cause of the concreteness effect in L1 acquisition is that acquiring concrete words is often supported by the tangible, visible, audible, or palpable presence of the corresponding objects in the child's surroundings, whereas this sensory information is by definition missing for abstract words. If this explanation holds, a different explanation of the concreteness effect in FL vocabulary learning has to be provided because, in none of the pertinent studies discussed, the entities to which the to-be-learned concrete words referred were present in the learning environment (although these objects may have been imagined by the participants, a process that may have caused or contributed to the effect).

De Groot and Keijzer (2000) suggested two possible causes of the concreteness effect in FL vocabulary learning; both attribute the effect to differences between the memory representations of concrete and abstract words. Both explanations assign a critical role to the amount of information concerning the L1 word that is stored in memory: The more information that is stored, the more opportunity the learner has to anchor the to-be-learned FL word form onto it and therefore the more successful learning is. One of these explanations is in terms of dual-coding theory (see also the section on keyword mnemonics), which assumes two memory representations for concrete words, one in the verbal system and one in the image system, whereas only one, stored in the verbal system, is assumed for abstract words. Note that this state of affairs implies that dual-coding theory assumes qualitatively different memory representations for concrete and abstract words.

The second explanation is in terms of the differential informational density of memory representations for concrete and abstract words within an amodal, monolithic memory system (De Groot, 1989; Kieras, 1978; Van Hell & De Groot, 1998b; Van Hell & Sjarbaini, 2004). Within this framework, the memory representations of concrete and abstract words are only assumed to differ quantitatively, not qualitatively: Those of concrete words are assumed to contain more information elements than those of abstract words (see De Groot, 1989, for experimental support). Again, this allows more anchoring opportunities in the case of learning a FL word form for concrete L1 words. Lotto and De Groot (1998) proposed this same explanation for the (relatively small) frequency effect in FL vocabulary learning that has sometimes (but not reliably) been obtained.

This explanation of the concreteness effects in FL vocabulary learning cannot account for the analogous effects in L1 vocabulary acquisition by toddlers. The reason is that the former effects result from differences in memory structures for concrete and abstract words that presumably reflect the outcome, not the beginning, of the L1 acquisition process. At the onset of L1 vocabulary acquisition, representations are not likely to exist in memory for either concrete words or abstract words; in other words, at that stage concrete and abstract words do not differ with respect to their memory representations; the buildup of memory information for both types of words presumably starts from scratch. A plausible explanation for the concreteness effect in L1 vocabulary acquisition was already provided above: Only the acquisition of concrete words, not that of abstract words, is supported by the perceptual presence of these words' referents in the child's environment.

Cognate Status

Lotto and De Groot (1998) and De Groot and Keijzer (2000) suggested three possible sources for the superior FL vocabulary learning performance for cognates, considering both the learning stage (storage) and the testing stage (retrieval) as possible loci of the effect. The first explanation extends a view of bilingual memory representation that assumes shared representations for cognates, but language-specific representations for noncognates (Kirsner, Lalor, & Hird, 1993; Sánchez-Casas, Davis, & García-Albea, 1992; see also Sánchez-Casas & García-Albea, chapter 11, this volume). In fact, a cognate relation between two words is considered a special case of a morphological relation that may exist between words within the same language and that is reflected in the joint storage of morphologically related words in memory. According to this view, bilingual memory, just as monolingual memory, is organized by morphology, not by language. For instance, a French-English bilingual has one memory representation containing both the English words *marry*, *marriage*, and *married* and the French words *marier* and *mariage* (Kirsner et al., 1993). If true, the learning of a FL word that shares a noncognate relation with the corresponding L1 word involves creating a new entry in memory, whereas learning a cognate word may only involve adding new information to, or adapting, a representation already stored there prior to the learning episode. The latter process may be less demanding than the former, causing the learning advantage of cognates over noncognates.

A second possible cause for the cognate advantage is that in the case of learning a FL cognate, which shares form with its translation, less has to be learned than when a noncognate FL word has to be learned. Finally, because of the form overlap between cognate translations and the absence of such overlap in the case of noncognates, when a cognate is presented as the testing stimulus, it will constitute a strong cue for the retrieval of its translation equivalent in the target language. These three suggested causes of the effects of cognate status do not have to be mutually exclusive, but may all contribute to the effect.

Word-Type Dependent Effects on Forgetting

The differential forgetting of concrete words and cognates on the one hand and abstract words and noncognates on the other suggests that, in terms of Atkinson (1972), immediately after training abstract words and noncognates are in a *T* (for temporal) state relatively often. This means that the newly learned word is only known temporarily, and that subsequent learning of other words will cause interference, causing forgetting of the previously known word. The second state Atkinson distinguishes is a *P* (permanent) state for newly learned words that have gained a permanent status in memory immediately after training. The data suggest that concrete words and cognates have reached a P state relatively often at the conclusion of the training phase. A third possible state that

words presented for learning can be in, and that abstract words and noncognates are in relatively often immediately after training, is the *U* (unknown) state. Of course, distinguishing between these three retention states only concerns a rephrasal of the effects obtained, not an explanation. A true explanation may ultimately be provided in terms, again, of differential memory representations for different types of words (e.g., being embedded in a denser representation and, as such, being linked to a relatively large number of information elements in memory might render a newly learned FL word relatively immune to forgetting).

The Role of Phonology in Foreign Language Vocabulary Learning

The cognate effect observed in the picture association learning condition in the work of Lotto and De Groot (1998) and Kroll et al. (1998) suggested that participants generated the names of the presented pictures during learning (see Word-Type Effects on Learning). This was regarded as support for the view that phonology plays an important role in FL vocabulary learning. Gathercole and Thorn (1998) reviewed the relevant literature and provided overwhelming support from various sources for this view.

For instance, Papagno et al. (1991) showed that an experimental technique called *articulatory suppression* disrupts the learning of FL vocabulary (although suppression had little effect on meaningful paired-associate learning in L1). The articulatory suppression technique involves the repeated uttering of a sound (e.g., *bla*) while learning the paired associates consisting of, say, an L1 word and its FL translation. Suppression interferes with the phonological recoding of visually presented items, thus preventing their short-term phonological storage. Furthermore, suppression interferes with "subvocal" rehearsal, a process that is deemed necessary for transfer from short-term memory into long-term memory.

Service (1992), in a 3-year longitudinal study of Finnish children learning English as a FL, showed a close relationship between the children's ability at the start of the program to repeat presented pseudowords and their grades in English at the end of the program. Subsequent work (Service & Kohonen, 1995) suggested that this relationship was mediated by English vocabulary knowledge. Pseudoword repetition is assumed to involve phonological memory, and the level of accuracy at which the task is performed is thought to reflect phonological-memory skills and capacity. Therefore, these data also suggest a relation between phonological memory and FL vocabulary learning. This conclusion is strengthened further by neuropsychological evidence: Baddeley et al. (1988) showed that their patient P. V., who had a reduced phonological store capacity, was unable to repeat back pseudowords longer than three syllables and to learn auditorily presented pseudowords paired with real words.

The important role of phonology in FL vocabulary learning is further supported by studies using experienced FL learners. Papagno and Vallar (1995) observed that polyglots performed better than nonpolyglots in phonological memory tasks and in FL paired associate learning, suggesting a relation between phonological-memory capacity and FL vocabulary learning.

Van Hell and Candia Mahn (1997) observed that experienced FL language learners benefited more from rote rehearsal learning than from keyword learning. They proposed that subvocal rehearsal of the FL word and its translation activates phonological codes, and that experienced learners in particular benefit from using phonological information in learning novel FL words. Specifically, experienced FL learners not only may have better phonological memory skills (as suggested by Papagno and Vallar's 1995 study), but also may possess more refined long-term knowledge of phonological structures. For example, the experienced FL learners in Van Hell and Candia Mahn's study had all learned the subtle, yet important, differences in the pronunciation of the cognate *hotel* across the Dutch, English, French, and German languages. This fine-grained and broad repertoire of phonological knowledge, along with better phonological memory skills, may make experienced FL learners more receptive to the phonological information novel FL vocabulary contains and may thus guide and facilitate the learning of novel FL words.

Finally, the "typicality" of the FL words to be learned affects their learning; that is, if the sound structure of the to-be-learned words conforms to the phonotactic rules of the learner's native language, learning is more successful than when phonotactically alien FL words are presented for learning. Gathercole, Martin, and Hitch (in Gathercole & Thorn, 1998) varied the nonwords in word–nonword pairs on "wordlikeness" (in terms of sound structure) and demonstrated that more wordlike nonwords than non-wordlike nonwords were learned. Similarly, immediately after learning,

De Groot and Van den Brink (2004) obtained recall scores that were 14% higher for phonotactically typical nonwords than for phonotactically atypical nonwords. Furthermore, a week after learning, more forgetting had occurred for the latter. (This is yet another demonstration of the earlier finding of De Groot and Keijzer, 2000, that words hard to learn are more easily forgotten than words relatively easy to learn.) All these findings converge on the conclusion that, during the learning of FL vocabulary, phonological codes are generated and used to support the learning process: The typicality effect is likely to arise from the fact that the generation of phonological codes is easier for phonotactically typical words than for atypical such words.

Baddeley, Gathercole, and Papagno (1998) proposed a model of the phonological loop that accommodates the findings of the studies discussed above (and those of many other studies; see Baddeley et al., 1998; Gathercole & Thorn, 1998). The phonological loop, a component of the multicomponent model of working memory, is specialized in the retention of verbal information over short periods of time. The phonological loop includes a phonological store (which holds information in phonological form) and a rehearsal process (which serves to preserve decaying representations in the phonological store).

The primary function of the phonological loop is to mediate language learning by providing a temporary storage of unfamiliar phonological forms (novel words) while more permanent memory representations are constructed. It is proposed that the phonological loop and long-term knowledge of the language operate in an interactive manner. Relevant for FL vocabulary learning is the assumption that the phonological loop function in FL learning is enhanced by instructions that emphasize subvocal rehearsal, as in rote rehearsal (e.g., Ellis & Beaton, 1993a; Van Hell & Candia Mahn, 1997), and is disrupted by articulatory suppression (e.g., Ellis & Sinclair, 1996; Papagno et al., 1991).

Baddeley et al. (1998) proposed that the phonological loop function may vary across individuals. Specifically, the natural talent of polyglots, or gifted language learners in general, for learning language may arise from an excellent phonological loop function. (See also Michael and Gollan, chapter 19, this volume, for a discussion of other aspects of working memory, such as working memory capacity, that may play pivotal roles in becoming proficient FL users.)

Freeing and Fine-Tuning the Newly Learned Foreign Language Words

The storage of durable representations for the newly learned FL word forms in memory by means of any of the learning methods discussed above—keyword mnemonics, rote rehearsal, word association learning, or picture association learning—is only a first step toward establishing an FL word representation that resembles a native speaker's representation of this same word and that enables the access (in comprehension) and retrieval (in production) of this representation in a way that resembles these processes in a native speaker. So far, the new representation consists of little more than an extra element—the FL word label—attached to (or embedded in) the representation for the corresponding native language word. At this learning stage, when this new word form is encountered by the FL learner in actual FL speech or writing, he or she can only come to grips with it by assigning it the meaning of the corresponding L1 word.

There is evidence to suggest that, during the very initial stages of learning, this process of L1 meaning assignment proceeds indirectly via the L1 word form (Chen & Leung, 1989; Kroll & Curley, 1988; Kroll & Sholl, 1992; Kroll & Stewart, 1994; Sholl, Sankaranarayanan, & Kroll, 1995; cf. Weinreich's 1953/1974 subordinate type of bilingualism; see also Kroll & Tokowicz, chapter 26, this volume). Similarly, during FL language production, the retrieval of the FL word form is assumed to start with the activation of the meaning representation of its translation in L1 and then to "pass through" the L1 form representation before the FL form is retrieved and produced. Soon after, with increasing FL experience, the FL word form starts to become functionally detached from the corresponding L1 word form representation and to access meaning as directly as the corresponding L1 word does.

A number of studies have suggested that such "freeing" of the FL word form from the L1 word form starts very early on in the FL learning process for this word (Altarriba & Mathis, 1997; De Groot & Poot, 1997; Potter et al., 1984). Ultimately, retrieval of this word form in FL will no longer exploit the L1 word-form representation at all (cf. Weinreich's, 1953/1974, "coordinate" bilingualism).

Assigning FL words the meaning of the corresponding L1 words, either indirectly via the L1

word forms or, later, directly would imply the use of a strong "semantic accent"; the reason is that translation "equivalents" seldom share all aspects of their meaning: The meaning aspects specific to the word in L1 would be implied when using its L2 (second language) equivalent (see MacWhinney, chapter 3, this volume, for other types of L1 transfer in FL learning). Highly technical words possibly constitute the only exception to the apparent rule that the meanings of a word and its closest translation do not overlap perfectly (Fries, 1945, in Boyd Zimmerman, 1997, p. 11), although for particular classes of words (concrete words) the overlap in meaning between the two languages is larger than for other classes (abstract words; emotion words).

For this reason, De Groot (1992; see also Van Hell & De Groot, 1998a) proposed the "distributed feature" model of bilingual lexical representation as an alternative to the more common "localist" models. In this model, word meaning is represented in memory as a set of semantic features, some of which are shared between a pair of translations, whereas others are unique to either the L1 word or the FL word. Translations of concrete words share more of these semantic features than translations of abstract words (see Kroll & Tokowicz, chapter 26, this volume, for further details).

Furthermore, assigning a FL word the meaning of "its" translation equivalent entails the flawed assumption that a word has only one meaning, whereas the truth is that words typically have many different meanings (some claim from 15 to 20 in English; Fries, 1945, in Boyd Zimmerman, 1997, p. 11), some of which are related, but others apparently are unique. Which of a word's many meanings should be assigned to it when it is encountered in speech or reading depends on the context of use.

This plethora of meanings and shades of meaning words may have and the context dependence of word meaning have frustrated the attempts by many to obtain exact definitions of words and have led others to accept the view that "word meanings cannot be pinned down, as if they were dead insects. Instead, they flutter around elusively like live butterflies. Or perhaps they should be likened to fish which slither out of one's grasp" (Aitchison, 1987, p. 40). Or, in the words of Labov (1973, in Aitchison, 1987): "Words have often been called slippery customers, and many scholars have been distressed by their tendency to shift their meanings and slide out from under any single definition" (p. 40). In keyword mnemonics, word association learning, and picture association learning, only one of this plethora of meanings is singled out (either by the stimulus itself, e.g., the picture of a mug, or by the learner), leaving all remaining meanings of the FL word yet to be learned through other means.

Insight into learning the meaning of words in more advanced FL vocabulary learning was provided by Bogaards (2001). He studied the learning of new meanings for known words and for combinations of known words in learners of French, all native Dutch speakers, who were in their fourth year of learning this FL in high school. The results of this study (see the original reference for details) suggest that both previously learned word forms and word meanings may promote the learning of new meanings for familiar forms and expressions comprised of familiar forms.

In sum, for ultimate use of a FL word in a nativelike way, the FL word form must provide access to meaning and be retrieved from conceptual representations directly, bypassing the form representation of its L1 translation. The meaning that is initially associated with the FL word (the meaning of its L1 translation) must gradually be narrowed (to get rid of the unique L1 meaning parts), extended (to also cover the unique L2 meaning parts or be used in multiword expressions) and refined such that it covers all of its FL meanings and captures the specific connotations of each.

Needless to say, gaining such a detailed level of FL vocabulary knowledge requires extensive practice of the FL words in contexts varied enough to acquaint the learner with the finesse of all their meanings. Apart from extended immersion in an environment in which the FL is the dominant language, only extensive reading in that language is likely to provide that outcome. The initial, flimsy representations set up via the direct instruction methods discussed here provide no more than the means to bootstrap into this time-consuming learning process, but as such are extremely valuable.

The Effect of Background Music on Learning Foreign Language Vocabulary

When performing cognitively demanding tasks, some people prefer a quiet environment, claiming to be hindered by noise, including music, whereas others seem not to be bothered by a certain noise level or even prefer (a particular type of) background music while performing the task, claiming to perform better under those circumstances. This observation, if confirmed and understood in

rigorous research, has obvious pedagogical implications as it might, for instance, inform teachers about how to create the optimal learning environment in the classroom and advise students with respect to the most effective circumstances to do their homework. Of course, the potential impact of well-controlled studies into this topic reaches far beyond the classroom because cognition is involved in the majority (if not all) tasks to be performed by humans, even tasks performed automatically most of the time.

Acknowledging its potential importance, the effect of background music (and other types of noise ignored in the present discussion) on task performance has been a topic of study by several groups of researchers, most notably applied psychologists, cognitive psychologists, and personality psychologists. The applied psychologists among these researchers primarily tried to find out whether music affects workers' satisfaction and morale or their productivity at work. The cognitive psychologists' goal was to look at ways in which music affects attention and processing in various tasks. The personality psychologists' focus was on the way music and different musical styles interact with individual differences in personality. See Furnham and Allass (1999) and Furnham and Bradley (1997) for a historical overview of this work.

The role of background music in learning has also received the attention of teachers and educators with an interest in a field of study carrying the esoteric name of Suggestopedia, a name based on a teaching method thus dubbed and introduced in Bulgaria by Lozanov (1978, in Felix, 1993). The innovative element this learning method introduced in the classroom was the systematic use of music in the instruction process. Especially, classical baroque music was thought to support the learning process. Felix (1993) reviewed the pertinent studies and concluded that positive effects of music played during learning have been reported for vocabulary learning and reading performance; that effects of music played during testing do not consistently occur; and that playing the same music during both learning and testing leads to the best achievement. The latter finding exemplifies the well-known phenomenon of "context-dependent" memory, that is, that test performance is better the more similar the circumstances under which testing occurs are to the circumstances present while learning (e.g., Godden & Baddeley, 1975).

De Groot and Van den Brink (2004) looked at the effect of background music on learning "FL words" (which in fact were pronounceable and nonpronounceable nonwords) for a set of Dutch words. The participants were all drawn from the same population of relatively experienced FL learners. Half of them learned the FL words in silence; the other half learned them while part of the Brandenburg Concerto by J. S. Bach was playing in the background. During testing, no music was played to either group of participants. The results were promising, but not in all respects conclusive: The recall scores were higher (by 8.7%) in the music condition than in the silent condition, but this effect only generalized over items, not over participants. This finding suggests that only a subset of the participants in the music condition benefited from the presence of background music. It also suggests that the remaining participants in this condition also were not hindered by it because otherwise an overall null effect of the music manipulation might have been expected.

Studies by Furnham and Bradley (1997) and Furnham and Allass (1999) hinted at an exciting explanation of why the effect of the music manipulation did not generalize over participants. Inspired by Eysenck's (1967) theory that introverts and extraverts differ in their levels of cortical arousal, they predicted that background music might have a detrimental effect on cognitive task performance in introverts, but a beneficial effect on such performance in extraverts. Manipulating this personality trait, Furnham and Allass observed that introverts performed substantially better in the silent condition than in the (pop) music condition in a reading comprehension task and a recall task, whereas for extraverts exactly the opposite pattern of results was obtained. The detrimental effect of music for the introverts was larger in a condition in which the music played was complex than in a condition in which it was simpler. Again, this pattern reversed for the extraverts.

Furnham and Bradley (1997) also demonstrated an interaction between the introvert/extravert variable and the music variable on two cognitive tests, one a reading comprehension test and the second a memory test, and Daoussis and McKelvie (1986) showed a similar interaction in a study looking at reading comprehension. The results of the last two studies differed from those of Furnham and Allass (1999) in that music had a detrimental effect on the cognitive performance of introverts, whereas extraverts appeared immune to the effects of the music manipulation. But, all three studies converge on the same conclusion: The introvert/extravert personality trait plays an important role in the effects of background music on cognitive performance.

The authors of the three studies just discussed all turned to Eysenck (1967) to account for this intriguing interaction between the introvert/extravert personality trait and the presentation of music during learning. Eysenck posited that introverts have a lower neurological threshold of arousal and therefore experience greater arousal in response to lower-intensity stimulation than extraverts; this results in introverts' satisfaction at relatively low levels of stimulation. It was posited that in introverts optimum performance is reached at moderate levels of arousal. In contrast, extraverts require relatively high levels of arousal for optimal performance (Furnham & Allass, 1999, pp. 28–29). Presumably without awareness of this alleged underlying physiological cause, introverts and extraverts are apparently aware of the effect of background music on their study success because extraverts claim to play background music more often while studying than introverts (Daoussis & McKelvie, 1986; Furnham & Bradley, 1997).

This account of music effects on learning provides a possible explanation for the above finding by De Groot and Van den Brink (2004) that the effect of the music manipulation did not generalize over all participants. In that study, the introvert/extravert personality trait was not taken into account, and the participant sample most likely included both introverts and extraverts. The extraverts may have benefited from background music, causing the overall higher recall scores in this condition. The fact that a net positive effect of background music was obtained suggests that the introverts were neither helped nor hindered by background music.

The role of a number of other factors that may affect music's effect on learning success, such as music preference (see Etaugh & Michals, 1975, who studied the effect of this variable on reading comprehension), vocal versus nonvocal music (Belsham & Harman, 1977), and musical styles (e.g., classical, jazz, and popular; Sogin, 1988), is still largely unknown. The evident pedagogical implications of filling this knowledge gap on creating optimal learning environments warrant increased research efforts devoted to unraveling the relevant variables and their interactions.

Individual Differences in Learning Foreign Language Vocabulary

At various points in the preceding sections, we alluded to the existence of individual differences in the learning of FL vocabulary, both differences between learner groups and differences within groups of learners. For instance, it was pointed out that advanced (experienced) learners of a particular target language benefit less from keyword mnemonics than less-advanced (inexperienced) learners of that language do (e.g., Moore & Surber, 1992), and that for multilingual language users, who have considerable experience with learning FLs, rote rehearsal is a more effective learning method than keyword mnemonics is (Van Hell & Candia Mahn, 1997). Lotto and De Groot (1998) obtained a similar result: They showed that multilingual language users, sampled from the same population as the participants in Van Hell and Candia Mahn's study, learned more FL vocabulary when a word association method was used than when the picture association method was employed.

In contrast, Wimer and Lambert (1959), comparing word association learning with object association learning (in which the word to be learned is paired with an object rather than a picture of that object), obtained better recall performance with object association than with word association. They concluded that "environmental events are more effective stimuli for the acquisition of foreign-language responses than are native-language equivalents for the new words, at least for the learning of a simple, basic vocabulary" (p. 35). The results of Lotto and De Groot (1997) and (if imaging objects plays the same role in learning as actual objects or pictures of actual objects do) those of Moore and Surber (1992) and Van Hell and Candia Mahn (1997) suggest that this conclusion does not hold for all groups of learners. Possibly, the participants in Wimer and Lambert's study were relatively inexperienced FL learners. If so, this combined set of studies would suggest that learner group and learning method interact such that, for experienced FL learners, the word association technique (or rote rehearsal, as one particular implementation of this technique) is more effective than learning techniques that employ the visual (imagined or actual) analogues of the FL words to be learned, and that for less-experienced learners the opposite holds.

The results of Kroll et al. (1998; Experiment 1) that, just as Lotto and De Groot (1998) contrasted word association and picture association learning, provide some direct support for this suggestion: Whereas Lotto and De Groot, testing experienced FL learners, obtained better results overall with word association learning than with picture association learning (82% correct for word association learning vs. 77% correct for picture association

learning; only productive testing was employed), Kroll et al., who tested less-experienced language learners, obtained the opposite pattern of results (78.5% and 39.5% correct for word association learning in receptive and productive testing conditions, respectively, vs. 82% and 42% for these testing conditions, respectively, following picture association learning; all data collapsed across a test condition that tested with picture stimuli and one that tested with word stimuli). That the participants in Kroll et al.'s study were less-experienced learners than those of Lotto and De Groot is strongly suggested by the far lower learning scores in the productive testing condition in the work of Kroll et al. than in that of Lotto and De Groot. Furthermore, to achieve an overall recognition accuracy of 70% in the (relatively easy) receptive testing condition, the data of only half of the participants (45 of 99) could be included in the analyses (see Kroll et al., 1998, pp. 379 and 381). In Lotto and De Groot (1998), to achieve at least 60% accuracy in the (relatively hard) productive testing condition (the only condition that they tested), only 8 of the 64 participants tested had to be removed from the analyses (p. 43).

The amount of FL learning experience is unlikely to be the only variable that interacts with the specifics of the learning environment. That other factors may be relevant as well was implicit in our discussion of the effect of background music on learning FL words. As shown, the relevant literature suggests that the personality trait introversion/extraversion interacts with a role of background music. We hypothesized that the pattern of results obtained by De Groot and Van den Brink (2004), who tested experienced FL learners exclusively, emerged from an interaction between this personality trait and the music manipulation. If that analysis is correct, the results of that study indicate that FL learning experience is only one of the factors that determine what the optimal learning circumstances are. In other words, the effects of FL learning experience and background music both suggest that there is no single optimal procedure of learning FL vocabulary, but that instead the optimal procedure depends on learner characteristics. Different learners may benefit most from different circumstances, and the same learner may benefit most from different circumstances at different stages of learning.

Differences in phonological knowledge and processes and other aspects of working memory, such as working memory capacity, were mentioned as yet another source of individual differences in FL vocabulary learning (Baddeley et al., 1998; Papagno & Vallar, 1995; see also Michael & Gollan, chapter 19, this volume). As we have seen, phonological coding appears to play an important role in transferring newly learned words from transient memory stores into permanent memory, and the presence of fine-grained phonological knowledge in long-term memory may increase the learner's receptiveness to subtle phonological differences in the learning material.

Baddeley et al. (1998) suggested that the phonological loop function differs between individuals, and that gifted language learners are characterized by an excellent such function. The amount and subtlety of phonological information in memory is obviously a function of the amount of language experience, native and foreign, a learner has, so that ultimately language learning experience may underlie (a substantial part of) the effects of phonological skills on FL language learning. It remains to be seen whether, if all other things (such as language learning experience) are equal, a thing such as "talent" for learning FLs can still be identified.

Conclusion

This review of studies on FL vocabulary learning has highlighted some of the factors that need to be taken into account to gain a complete understanding of successful learning performance; it has only briefly touched on, or even completely ignored, other factors. For instance, much attention was devoted to contrasting the various direct FL vocabulary learning methods and pointing out their limitations and the ways they interact with learner characteristics such as FL learning experience and phonological skills. Similarly, the fact that various word characteristics determine the success of learning FL equivalents for L1 words and the way these effects can be explained were discussed at length.

We also reviewed at some level of detail the research that tries to resolve the dispute regarding the role that background music may play in FL vocabulary learning. Finally, some discussion was devoted to the later stages of FL vocabulary acquisition, in which the newly learned FL words are functionally detached from their L1 counterparts, and their meaning representations gradually develop toward those of L1 users of the FL concerned.

Other aspects of FL vocabulary learning received little or no attention, for instance, the role of

proximity of the to-be-learned FL to the learner's L1. This issue was only briefly touched on in the discussion of the effect of word typicality on learning performance. The larger the distance between L1 and the FL to be learned, the more FL word forms to be learned will be atypical for the learner, the more alien the meanings of the FL words will be to the learner, and the more mapping problems between elements in the L1 and the FL the FL learner will encounter. FL vocabulary learning studies that test a FL similar to the learner's L1 (or that test the learning of pseudowords, which by definition have phonological forms akin to the learner's L1) may overestimate learning performance as compared to testing more distant FLs. Such effects of language proximity/distance warrant a more thorough discussion than received here.

A further neglected topic concerns the large difference in performance that is typically obtained between productive and receptive testing conditions, with receptive testing producing better results. Mention was made of these two ways of testing newly learned FL vocabulary, but without providing theoretical accounts of this effect (see De Groot & Keijzer, 2000, pp. 43–45, for a discussion).

Finally, hardly anything has been said on the crucial differences between late FL vocabulary learning, which, albeit implicitly, was the topic of the present discussion, and early bilingual vocabulary acquisition (see De Houwer, chapter 2, this volume). These learning processes differ crucially because, in early bilingual vocabulary acquisition, as in L1 vocabulary acquisition, the acquisition of word form and word meaning proceed in parallel, whereas in late FL vocabulary learning, a meaning for the new word to be learned is already in place (although it requires adjustment; see the section Freeing and Fine-Tuning the Newly Learned Foreign Language Words). Future reviews of studies on FL vocabulary learning might shift the focus to these and other issues neglected here.

Notes

1. A *foreign language* is a language that is not a native language in a country. In North America, *foreign language* and *second language* are often used interchangeably in this sense. In British usage, a distinction between the two is often made, such that a *foreign language* is a language taught in school but not used as a medium of instruction in school, nor is it a language of communication within a country (e.g., English in France). In contrast, a second language is a language that is not a native language in the country, but is widely used as a medium of communication (e.g., in education and government) and is used alongside another language or languages (e.g., English in Nigeria). In both Britain and North America, the term *second language* describes the native language in a country as learned by immigrants who have another first language (*Longman Dictionary of Language Teaching and Applied Linguistics*). In this chapter, we consistently use the term foreign language (FL) to cover all these usages, although most of the studies described concern the learning of a FL in experimental settings by learners whose native language is the dominant (and only official) language in the country where they live.

2. Note that the term *word association learning* should not be confused with the word association technique often employed in semantic memory research, in which the structure of semantic memory is revealed by presenting participants with words they know, and they are asked to provide the first word they think of after they are given a stimulus word.

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2

Early Bilingual Acquisition

Focus on Morphosyntax and the Separate Development Hypothesis

ABSTRACT This chapter discusses morphosyntactic development in bilingual children under age 6 years. The primary focus is on the relationship between children's two languages in production. The available empirical evidence so far from children acquiring 13 different language combinations strongly supports the Separate Development Hypothesis (SDH), which states that in learning to speak, children raised with two separate languages from birth approach their languages as two distinct, closed sets. The SDH can only be meaningfully addressed, however, after taking into consideration some basic methodological and analytical steps. A second point of focus is a comparison of monolingual and bilingual acquisition. Apart from the fact that bilingual children can communicate in two languages and monolingual children just in one, the acquisition process appears to be very similar in the two populations. A final issue is the structure of mixed utterances. Young bilingual children's mixed utterances do not differ much from those of adult bilinguals, albeit that they appear to be less varied in nature. The majority of young bilingual children's lexically mixed utterances consist of noun insertions from one language into an utterance in another language. Given the robust nature of the findings supporting the SDH, the real challenge for the field of bilingual acquisition now is to explain how separate morphosyntactic development is possible.

The last 15 years have seen a great increase in publications reporting on the language use and development of young children exposed to more than one language from a very early age. Prior to the mid-1980s, however, empirical studies of how young children become bilingual were few. However, what the field of bilingual acquisition used to lack in volume is well compensated by its long history: The first empirical study of bilingual development dates from 1913, written by the French linguist Jules Ronjat. Aside from being the first book-length publication on early bilingual acquisition, this monograph was also the very first volume to present an empirical study of bilingual behavior and should receive a place of honor in any bilingualism scholar's library.

Before the mid-1980s, there were only three other data-based monographs published on the process of early bilingual acquisition (the book by García, 1983, does concern bilingual children, but does not offer a developmental perspective). Of these, the monumental work by yet another linguist, Werner Leopold, is by far the most famous and the most insightful. His four volumes appeared in several installments between 1939 and 1949 and were reprinted in 1970.

The most recent of the four early monographs is the much criticized volume by the psychologist Traute Taeschner (1983); it elaborates on earlier work published in the very influential, but also heavily criticized, article that Taeschner wrote with Virginia Volterra (Volterra & Taeschner, 1978). I briefly outline these criticisms in the section on the relationship between a child's two languages.

Less well known is the study on the acquisition of French and Serbian (''le serbe'') by the psychologist Millivoïe Pavlovitch (1920). This study differs from the other three in that it dealt with the very early acquisition of a second language (L2). The studies by Ronjat, Leopold, and Taeschner, in

contrast, were concerned with the acquisition of two first languages (L1s), as it were, that is, with cases for which the children in the study heard two languages from birth (and continued to do so at least until the time of study).

The present overview chapter also focuses on the acquisition of two languages from birth. Children who hear two languages from birth are undergoing a process of what Meisel (1989) called bilingual first language acquisition (BFLA; see also De Houwer, 1990). In BFLA, there is no "second" language in the chronological sense. It thus makes no sense to speak of an L1 or an L2. To refer to the two languages that play a role in BFLA, I use the terms language A and language Alpha (terminology borrowed from Wölck, 1984). This does not necessarily imply that both these languages need be on the same footing; that is, they need not be used in equal proportion or with equal frequency or regularity. Rather, the terms here refer to the input languages and specify that both input languages start to be used in regular communication with the child at the same time in development (viz., from birth or very soon afterward).

This chapter, then, reviews recent studies of children under the age of 6 years exposed to two spoken languages from birth who continued to hear these languages fairly regularly and frequently until the time of data collection (for a rare study that focused on the bilingual development of a signed and a spoken language in young children, see van den Bogaerde & Baker, 2002). Studies of children who have been regularly addressed in three or even more languages from birth do not feature in this review: So far, none appear to have been published (see Quay, 2001). There are, however, studies of children acquiring two languages from birth who start hearing a third language regularly once they are just a little older (see, e.g., Quay, 2001; Widdicombe, 1997).

I define *bilingual input* as dual-language input consisting mainly of substantial numbers of utterances that both lexically and structurally belong to one language only. Mixed utterances (i.e., utterances containing morphemes and/or lexemes from two languages) may account for some of the input as well. Even if the people in the child's environment address the child mainly in either of two languages and thus follow the "one person, one language" strategy (Ronjat, 1913), they will occasionally use mixed utterances. However, if a child hears nothing but mixed utterances, as might be the case in some so-called bilingual communities, I would argue that the child is not exposed to two languages from birth, but rather to one. After all, all the people interacting with the child would be using the same types of utterances, regardless of whether linguists could describe these as consisting of elements from two languages (cf. mixed languages in the sense of, e.g., Bakker, 1992). Bilingual input as understood here involves variation between strictly unilingual utterances in at least two languages, but will in most cases include mixed utterances as well.

I only refer to children acquiring varieties of what are commonly seen as distinct languages rather than a standard language and a regional variety of that same language, although the actual formal differences between them may in fact be similar to those between two different languages. The overview focuses on aspects of language production as it can be observed and recorded in naturalistic interactional settings. All studies mentioned here concern children growing up without any known handicaps or language learning problems.

A Frame of Reference for Studying Morphosyntactic Development in Young Bilinguals

In modern studies of monolingual acquisition, morphosyntactic development continues to be the most frequently investigated area of research. The same is true for recent work on bilingual acquisition. For instance, in an article giving an overview of many different aspects of BFLA published since 1985 (De Houwer, 1999b), 35 of the 64 original research articles or book chapters cited concerned morphosyntax; the 29 remaining texts were spread out over six other major research topics (i.e., the role of the input, the lexicon, phonological development, the use of mixed utterances, and language choice; I discuss all these aspects, in addition to morphosyntactic development, in De Houwer, 1995b, as well).

As the field of bilingual acquisition research grows and flourishes (see, e.g., the volume edited by Cenoz & Genesee, 2001), more and more different topics are under investigation. Nevertheless, more is currently known about morphosyntactic development in bilingual children than about any other area of language functioning. This justifies the primary focus here on morphosyntactic issues in early bilingual development.

In the field of language acquisition research, there have for a long time been divergent views

regarding the role and status of morphosyntactic categories in early language development and when it makes sense to use morphosyntactic categories for describing children's early language productions. The controversies focus mainly on what is commonly termed the two-word stage (compare, e.g., Lieven, Pine, & Baldwin, 1997, and Vihman, 1999). New lines of research in developmental psycholinguistics that focus on transitions and connections between different kinds of knowledge (phonological, lexical, morphological, and syntactic) hold great promise for greater insight into the roots of morphosyntactic development (see the contributions in Weissenborn & Höhle, 2001).

For the purposes of the discussion in this chapter, I consider morphosyntactic development in production to be evident once a child growing up bilingually has begun to produce utterances containing at least three clause constituents or two-word utterances containing at least one bound morpheme, whichever comes first. This is not to imply that from this point on children have an awareness or abstract knowledge of the morphosyntactic categories they are using, and I do not mean to imply that no such knowledge is available prior to this (as, e.g., Golinkoff, Hirsh-Pasek, & Schweisguth, 2001, have suggested, it is quite possible that children as young as 18 months have a representation of some morphological categories well before they use these categories in production).

Space does not permit an extensive explanation, but I believe that the fairly conservative position taken here strikes a reasonable balance between overestimating and underestimating a child's grammatical skills. At the same time, it takes into consideration the huge typological differences between different languages as far as their reliance on constituent order versus bound morphology is concerned. Clearly, my position here excludes the one-word stage as a relevant focus of interest for a discussion of morphosyntactic development. This corresponds to what appears to be a consensus in the field of language acquisition in general: Morphosyntactic analyses of single-word utterances when children are still in the one-word stage are conspicuous by their absence (it is acknowledged, however, that at the one-word stage, precursors of bound morphology may be already present; see, e.g., Peters, 1983).

For the so-called two-word stage (which may be very drawn out or so brief it is hardly noticeable), there is less consensus (see above), but my proposal for bilingual data here is in line both with Meisel's (1994) reluctance to see children's early two-word utterances as exhibiting syntactic properties and Deuchar and Quay's (2000, pp. 82–83) view that later two-word utterances that show morphological markings are in principle analyzable in morphosyntactic terms. Once children produce a large proportion of multiword utterances, child language researchers seem to agree that it is fully appropriate to describe their language use in morphosyntactic terms.

The Relationship Between a Child's Two Developing Languages: The Status of the Separate Development Hypothesis

Ronjat (1913) was not only the first to publish an empirical study on a bilingual individual's language use, but was also the first to formulate generalizations regarding the relationship between a young bilingual child's two languages. In addition, Ronjat was the first to address, based on empirical data, the issue of the relationship between a bilingual speaker's two languages.

It is this relationship between bilingual children's two languages that continues to be in the limelight in bilingual acquisition studies today. Basically, the question is to what extent and at what point in overall development a bilingual child's two separate input languages are processed as two independent systems. As researchers develop more sophisticated tools to investigate bilingual infants' perceptual capabilities and earliest vocalizations (see, e.g., Bosch & Sebastián-Gallés, 2001; Poulin-Dubois & Goodz, 2001), this question may finally have a chance of being answered. However, both the methodological and the analytical problems are quite formidable and have led some researchers to question whether in fact it will be possible to address fully the issue for children's very earliest stages of linguistic development. In particular, determining whether bilingual children's early phonologies develop as separate systems or not is quite a daunting task (Johnson & Lancaster, 1998; cf. also Deuchar & Quay, 2000, p. 111).

Earlier publications strongly defended either the Independent Development Hypothesis (e.g., Bergman, 1976), which claims that from the very beginning of language development infants who were hearing two languages from birth develop two independent systems, or, alternatively, they strongly supported the one hybrid system interpretation

(e.g., Leopold, 1939–1949/1970, Vol. 2, p. 206; Volterra & Taeschner, 1978, p. 312), which posits an initial processing of two input languages as one hybrid system. Both these opposing points of view made their claims regarding all basic levels of language functioning (i.e., phonology, lexicon, morphosyntax). Within the hybrid system view, it then became crucial to try to explain just how children did in fact eventually manage to "differentiate" between their languages (see, e.g., Arnberg & Arnberg, 1992). Today, researchers are fortunately much more aware of the methodological and theoretical complexities involved in explaining the very earliest stages of bilingual development and understandably reluctant to make definitive claims.

For the development of morphosyntax in production, however, the issue of the extent to which bilingual children speak like the people acting as models for their two input languages is in principle much more amenable to investigation. Once children start showing clear signs of morphosyntactic development in production, which typically occurs around their second birthday (cf. the previous section outlining a frame of reference for studying morphosyntactic development), their phonologies tend to be more stable, and the huge problems of identifying language sources for children's vocalizations start to decrease steadily. It comes as no surprise, then, that many studies of language development in toddlers who grow up with two languages from birth have given a lot of attention to the relationship between children's developing morphosyntactic systems.

On the basis of an in-depth case study of a Dutch-English bilingual child, Kate, I proposed the Separate Development Hypothesis (SDH), which states that children regularly exposed to two languages from birth according to the one person, one language principle develop two distinct morphosyntactic systems in that "the morphosyntactic development of the one language does not have any fundamental effect on the morphosyntactic development of the other" (De Houwer, 1990, p. 66). At the time, there were only a few published studies that provided empirical support for the SDH (or the Differentiation Hypothesis, as Meisel, 2001, termed it), and the Kate study was the first to address the issue based on a very wide variety of morphosyntactic phenomena as present in the speech of one and the same child.

The 1990s saw an explosion of other studies providing additional support for the SDH. The fact that there is also a study (Deuchar & Quay, 2000) that supports the SDH even though the subject of this study did not quite hear her languages according to the one person, one language principle suggests that the input condition that is part of my original formulation of the SDH may in fact not be necessary. However, more studies are needed to investigate this issue. Also, I know of no studies that have explored young children's language development under mainly "mixed" conditions (i.e., when children heard most of the people in their environment speak two languages to them).

Because of the potentially very large role of input conditions, it is too early, then, to generalize the SDH to all children growing up with two languages from birth (see also De Houwer, 1990). At the same time, I know of no study that clearly shows evidence against the SDH. There appears to be a broad consensus among researchers today that the Separate Development Hypothesis accurately characterizes the basic process of morphosyntactic development in young bilingual children (see also Meisel, 2001, p. 16).

In the conclusion to my 1990 monograph, I speculated on the reasons that make separate development possible. One basic reason must be that young children pay very close attention to the variable nature of the input. Without at least this, it would appear impossible for young bilingual children to produce utterances that are clearly relatable to each of their input languages.

Given the existence of widely available earlier and in-depth reviews (Meisel, 1989; De Houwer, 1990, pp. 36–47, and 1995b; Lanza, 1997b; Deuchar & Quay, 2000), I only briefly mention a few of the many criticisms that have over the years been leveled at earlier claims concerning the initial stages of morphosyntactic development in bilingual children. These claims were part of the general "single-system" hypothesis (cf. the discussion in the third paragraph of this section). For early morphosyntactic development, they posited that children systematically apply "the same syntactic rules to both languages" (Volterra & Taeschner, 1978, p. 312), thus implying that very young bilingual children do not follow the ways of speaking of the people around them. In this view, bilingual children are seen as unable to keep two grammatical systems separate (Meisel, 1989), a process that has been called *fusion* in the bilingualism literature (Wölck, 1984). The authors making these claims do not refer to input conditions, but all the data supposedly supporting the claims come from children growing up according to the one person, one language principle.

A first basic problem is that the nature of the empirical support offered by Volterra and Taeschner (1978) and later by Taeschner (1983) is very unclear, and that the few analyses given showed internal inconsistencies and were often inaccurate (see, e.g., Mills, 1986; Meisel & Mahlau, 1988).

A more analytical problem is that Volterra and Taeschner, like Leopold (1939–1949/1970, Vol. 1, p. 179, and Vol. 3, p. 186) interpreted the use of lexically mixed utterances as evidence for a fused system. As I have argued (De Houwer, 1990, p. 39), the use of utterances that contain lexical items from two languages is not necessarily a reflection of one underlying language system. If so, all bilingual speakers would necessarily be operating with one fused system since all bilingual speakers at least occasionally use lexically mixed utterances. Rather, young bilingual children's lexically mixed utterances first and foremost need a sociolinguistic explanation: It needs to be investigated under which sociolinguistic conditions they do and do not appear and whether children are socialized in an environment that encourages their use or not (see also Lanza, 1997b). Once this is clear, psycholinguistic models can be constructed to explain the occurrence of mixed utterances and their form.

Volterra and Taeschner (1978) also discussed instances of lexically unilingual utterances that they claimed showed interference between their subjects' two languages. They considered such utterances to be evidence for their single-system hypothesis. As Meisel (1989) pointed out, the notion of "interference" requires the existence of two systems that can exert influence on each other. This is very different from positing, as Volterra and Taeschner (1978) and Taeschner (1983) did, one single rule system that gives rise to an "undifferentiated" language that by implication has as its output a type of language production that differs substantially from each input system.

The single-system or "Mish-Mash" hypothesis (a term used by Bergman, 1976) is not incompatible with the strong version of what I have termed a transfer theory of bilingual development (De Houwer, 1987, pp. 138–140, and 1990, p. 66). In its stronger version, such a theory assumes that "any morphosyntactic device belonging to input system A will be used in the child's speech production in utterances containing only lexical items from language B and vice versa" (De Houwer, 1990, p. 66). Stated in these empirically testable terms, support for the theory would consist of a quantitatively much higher proportion of utterances with lexical items from language A, but structural features of language Alpha than of utterances with lexical items and structural features from the same language (De Houwer, 1987, p. 138, and 1990, p. 66).

Following Slobin (1973), a weaker version of the transfer theory that is based on a kind of continuous comparison procedure between structures in both input languages, predicts transfer only if a particular morphosyntactic feature of input system A is less complex than a functionally equivalent feature of input system Alpha. Other proponents of this weaker version, such as Arnberg (1987, p. 68), however, tend to refer only to differences in formal complexity and ignore a crucial aspect in Slobin's original proposal: functional equivalence. The weaker version of the transfer theory is less easily testable since it is very difficult, if not impossible, to compare levels of formal complexity across languages (cf. De Houwer, 1987, pp. 138–139, and 1990, pp. 56–58).

Neither version of the transfer theory explains how children eventually do become able to combine lexical items from language Alpha with morphosyntactic features of the same language. Note also that the transfer theory presupposes a very great deal of creative tenacity in the young bilingual child that manifests itself even in the face of continuous contradictory and nonsupporting evidence as provided in the dual-language input.

So far, no studies have empirically shown the actual existence of the kinds of language repertoires predicted by the transfer theory in children with bilingual input from birth. For children undergoing a process of early L2 acquisition, though, clear and frequent signs of transfer may appear in one of their languages once children are beyond the silent stage (Ervin-Tripp, 1974; Tabors, 1987) and the formulaic stage (Wong-Fillmore, 1979). Preschool-aged children who start out hearing only one language from birth and who start regularly hearing an L2 on top of that at, say, age 3, may produce quite a few utterances with lexical items from L2 but structural features mainly from L1 (Fantini, 1985; Ekmekçi, 1994; Pfaff, 1994). The proportion of these kinds of utterances in relation to the child's overall production in L2 is not known, but they appear to be quite common.

The characteristics of children's L2 speech production are quite different from what is generally reported for young children with bilingual exposure from birth. These children's language production shows on the whole very little evidence of morphosyntactic transfer from one input system to the other (see also the section on studies of BFLA

that offer support for the SDH). Rather, most of young bilingual learners' utterances with words from language A have morphosyntactic features that are relatable to the same input language. The same goes for language Alpha as well. This is precisely what the SDH predicts.

In the next section, I discuss in more detail the basis for concluding whether there is separate development. First, though, it needs to be emphasized that, to be able to interpret the morphosyntactic features of their two input languages, bilingual children must have processing mechanisms that are able to approach each input language as a morphosyntactically closed set. So far, there have been no reports that bilingual toddlers or preschoolers are somehow slow or have difficulty in real-time comprehension of their input languages or switches between them, whether utterance-internal or not. However, this issue has to my knowledge not been explicitly addressed as yet. Since in young children language comprehension generally precedes and paves the way for language production (see, e.g., Bates, Dale, & Thal, 1995), it is not unlikely that separate development in comprehension is partly what makes separate development in production possible.

Methodological Requirements for Addressing the Separate Development Hypothesis

Once children with bilingual input from birth start to use morphosyntactic elements in their utterances, they use three types of utterances: (a) lexically unilingual utterances in language A, (b) lexically unilingual utterances in language Alpha, and (c) mixed utterances, which contain lexical items or bound morphemes from languages A and Alpha. These are also the types of utterances that older bilingual speakers produce and that will be present in the child's bilingual input.

The basic question to be answered is whether a child with bilingual input from birth follows a target-language-like developmental path in two languages (cf. the third section). Thus, it needs to be investigated to what extent the child's lexically unilingual utterances in language A use morphosyntactic features from language A and to what extent the child's lexically unilingual utterances in language Alpha use morphosyntactic features from language Alpha. The answer to this question will show the extent to which young bilingual children's lexically unilingual utterances resemble those used by the people around them and thus to what extent the SDH is an accurate descriptive generalization of early bilingual development. The SDH thus depends on analyses of lexically unilingual utterances only (De Houwer, 1990, p. 69, and 1994, 1998, p. 256; De Houwer & Meisel, 1996). Of course, should a child's repertoire consist mainly of mixed utterances, it becomes impossible to investigate the SDH (or its counterpart, the transfer theory). As it turns out, though, most of young bilingual children's utterances are lexically unilingual and thus offer ample opportunity for investigating the extent to which these unilingual utterances resemble target structures present in each of the input languages.

In principle, the SDH should be addressed on the basis of children's acquisition of aspects of morphosyntax that clearly differ between the child's two input languages but that are comparable in that they fulfill more or less the same function (cf. De Houwer, 1990; Meisel, 1989; for a particularly penetrating argumentation explaining this need, see Serratrice, 2002). After all, when both input systems use different morphosyntactic means for expressing a particular function, there are different expectations for their use in the child's language A than in language Alpha. When both input systems closely resemble each other for a particular feature, the child could not be expected to use different features.

An example will help clarify this point: In English yes-no questions involving lexical verbs, there is use of do-support as in "Do you want some tea?" In contrast, Dutch yes-no questions involving lexical verbs do not use do-support ("*Wil je thee*?" literally, "Want you tea?"). The SDH would predict do-support only in the child's lexically English questions and would not expect any do-support in the child's lexically Dutch questions. The transfer theory would expect either no do-support in English or do-support in Dutch. On the other hand, English and Dutch yes-no questions involving the copula have exactly the same structure: "Is that tea?" or "*Is dat thee*?" (literally, "Is that tea?"). Application of the Dutch rule to English or the English rule to Dutch gives the same result. Hence, English and Dutch yes-no questions with a copula are not constructions that can provide insight into whether children transfer rules from one language to the other.

Children may not always agree with linguists regarding what should count as a particular structure. Getting back to the example of the yes-no questions, it is quite possible that, for English,

a bilingual child has not yet learned that questions with a copula are structured differently from questions with a lexical verb. The child might use do-support for all English questions, including those with a copula. As long as the child does not use do-support in Dutch questions, though, there is no evidence of transfer. Rather, the child's overuse of do-support in English even lends stronger evidence for the SDH than if the child was producing do-support only when required.

But, what if the child does not use any do-support? The fact that she or he fails to use it when English requires it is not necessarily a result of transfer since English questions with a copula provide evidence that in English do-support is not necessary in all questions. The child may be overgeneralizing in English on the basis of English input evidence, and the child's lack of do-support may have nothing to do with influence from Dutch. The child's lack of do-support in English, then, cannot be interpreted. It is not support or lack of support for either the transfer theory or the SDH.

As I suggested elsewhere (De Houwer, 1994, p. 45), one way of getting around this interpretative problem might be to look at data from monolingual acquisition: If the bilingual child uses forms similar to those used in the same language by a monolingual peer, there is a possibility that the forms are intralinguistically determined. However, such a comparative approach can never entirely settle the issue since a similarity of form does not necessarily indicate a similarity in processing. Hence, intrinsically ambiguous forms in the bilingual data will often have to remain just that.

Clear evidence for the SDH, then, consists of the child using comparable structures that differ across both input languages in utterances with lexical items from the appropriate language. Although evidence for the SDH is not expected to be noticeable when both input systems closely resemble each other for a particular feature, such evidence might in fact occur if, at the same age, the child does use this particular feature, but only in one language. An example of this can be found in a study by Almgren and Idiazabal (2001). Their Basque-Spanish bilingual subject, Mikel, started using imperfective pasts to refer to imaginary events in Spanish 9 months before he did this in Basque. Yet, imperfective pasts can be used to refer to imaginary events in both Spanish and Basque.

To be able to conclude that one particular child is developing two separate morphosyntactic systems, a wide spectrum of morphosyntactic features must be studied. After all, it is possible that separate development holds in some areas of morphosyntactic functioning, but not in others.

For the SDH to be confirmed, then, separate development must be evident for most of the morphosyntactic structures in the child's speech that reflect differences in the input languages. Occasional instances of apparent transfer in lexically unilingual utterances of features that differ across the input languages do not detract from the validity of the SDH, but should of course only be very occasional (see further discussion in this section). They should occur in no more than a few percent of the relevant cases within a brief time frame (say, in all the recordings made in a month's time). Structures that appear to push the two systems apart even more than necessary are obviously additional evidence for the SDH (cf. the theoretically possible example above for which do-support is used in English yes-no questions with a copular verb). Morphosyntactic features that appear in both input languages as well as in the child's unilingual utterances are neutral to the SDH.

Analyzing all or most of the morphosyntactic features used by a bilingual child is highly time consuming. Most child language researchers therefore prefer to limit their analyses to specific subparts of children's language production. When these different analyses are combined, though, we actually get a random sample of a variety of structures used by different children living in different parts of the world and acquiring different language pairs. If the SDH is not valid, such a database should reveal this fairly easily. However, as I show in the next section, quite the contrary is the case.

Studies of Bilingual First Language Acquisition That Offer Support for the Separate Development Hypothesis

In this section, I give an overview of a large portion of the empirical studies published in the last 15 years that have looked at morphosyntactic development in children growing up with two languages from birth. All these studies show evidence of the separate development of morphosyntax, whether this was made explicit by the authors or not (Table 2.1). The analyses of the data in the studies listed in Table 2.1 that provide support for the SDH all refer to children's unilingual utterances and to aspects of morphosyntax that clearly differ across the two languages investigated.

Table 2.1 Empirical Studies on Bilingual Acquisition that Confirm the Separate Development Hypothesis

Child	Languages	Age(s)*	Study/Studies
Natalie	Slovak/English	1;3–5;7	Stefánik, 1995, 1997
Andreu	Catalan/English	1;3–4;2	Juan-Garau and Pérez-Vidal, 2000
Jean	French/Swedish	1;10–3;9	Schlyter, 1995
Mimi	French/Swedish	2;0–4;2	Schlyter, 1995
Anne	French/Swedish	2;3–4;4	Schlyter, 1995
Olivier	French/English	1;11–2;10	Paradis and Genesee, 1996
Gene	French/English	1;11–3;1	Paradis and Genesee, 1996
William	French/English	2;2–3;3	Paradis and Genesee, 1996
Mathieu	French/English	1;9–2;11	Paradis and Genesee, 1997
Yann	French/English	1;11–3;0	Paradis and Genesee, 1997
Odessa	French/English	2;7–2;9	Jisa, 1995
Anouk	French/Dutch	2;3–3;4	Hulk and Van der Linden, 1996
Kate	Dutch/English	2;7–3;4	De Houwer, 1990, 1997
Ivar	French/German	1;4–2;9	Meisel, 1990
		1;5–3;0	Müller, 1994a
		1;5–4;3	Meisel and Müller, 1992; Müller, 1990b
		1;5–5;0	Koehn, 1994
		1;5–5;10	Müller, 1994b
		1;10–3;0	Kaiser, 1994
		1;10–3;5	Schlyter, 1990a; Müller, 1993
		2;0–2;8	Meisel, 1994
		2;2–3;5	Klinge, 1990
		2;2–2;6	Köppe, 1994b
		2;4–3;5	Müller, Crysmann, and Kaiser, 1996
Pascal	French/German	1;5–4;0	Meisel and Müller, 1992; Müller, 1990b
		1;5–4;7	Müller, 1994b
		1;8–4;10	Stenzel, 1994
		1;9–2;11	Kaiser, 1994
		1;10–2;5	Köppe, 1994b
		1;10–3;5	Müller, 1993
		2;4–4;7	Stenzel, 1996
Annika	French/German	2;0–3;11	Stenzel, 1994
Caroline	French/German	1;0–3;6	Meisel, 1985
		1;0–3;1	Meisel, 1990
		1;6–3;0	Müller, 1995
		1;6–5;0	Meisel and Müller, 1992, Müller, 1990a, 1994a, 1994b
		1;10–3;10	Meisel, 1986, 1989
		1;11–2;8	Meisel, 1994
		1;11–4;6	Klinge, 1990
Christoph	French/German	1;1–3;8	Parodi, 1990
		1;11–3;5	Schlyter, 1990a
		2;3–3;8	Klinge, 1990
François	French/German	2;4–3;4	Schlyter, 1990a
Pierre	French/German	1;0–3;6	Meisel, 1985
		1;0–4;0	Meisel, 1990
		2;6–4;0	Meisel, 1989
		2;7–3;3	Meisel, 1994
		2;7–3;8	Meisel, 1986
Zevio	Spanish/English	0;11–4;6	Krasinski, 1995
Manuela	Spanish/English	1;7–2;3	Deuchar and Quay, 1998
		1;7–3;2	Deuchar, 1992
		1;8–2;2	Deuchar and Quay, 2000, pp. 82–87

(*continued*)

Table 2.1 (*Contd.*)

Child	Languages	Age(s)*	Study/Studies
Sonja	German/English	2;0–2;6	Sinka and Schelleter, 1998
Maija	Latvian/English	1;2–1;11	Sinka and Schelleter, 1998
Peru	Spanish/Basque	1;11–3;2	Idiazabal, 1988, 1991
		1;11–4;0	Barreña, 2001
Mikel	Spanish/Basque	1;6–3;0	Almgren and Barreña, 2000
		1;6–3;6	Barreña, 1997
		1;6–4;0	Barreña, 2001
		1;7–4;0	Almgren and Idiazabal, 2001; Ezeizabarrena and Larrañaga, 1996
Rie	Japanese/English	2;4–2;10	Mishina-Mori, 2002
Ken	Japanese/English	2;8–3;2	Mishina-Mori, 2002
Carlo	Italian/English	1;10–3;2	Serratrice, 2001, 2002

[a]Ages are indicated in years;months (months have been rounded up to the next month for children who were at least 20 days into the next month); a dash between ages means from age *X* to age *Y*.

In the field of child language research, several quite different methods are used to collect data. It is still the case, however, that data based on natural, spontaneous interaction are the most desirable when little is known about the developmental course of a particular language or pair of languages. Given the very scant knowledge about early bilingual acquisition up until about 15 years ago, it will come as no surprise that most of the studies reviewed here are longitudinal case studies that used spontaneous speech as their main database. For this reason, Table 2.1 is organized as a function of the children studied. This has the advantage of giving a clear picture of the current database on which present-day knowledge of morphosyntactic development in young bilinguals is based. Aside from listing the language combination acquired, Table 2.1 also shows the age ranges from which data were drawn in the studies reporting on a particular child's speech.

As Table 2.1 shows, the current database for studies that support the SDH consists of the speech productions of 29 children (17 boys, 12 girls) between the ages of 1 and nearly 6 years, who together are acquiring 12 languages in 13 different combinations. All but 2 of those 12 languages belong to the group of Indo-European languages (Catalan, Dutch, English, French, German, Italian, Latvian, Slovak, Spanish, and Swedish). The 2 non–Indo-European languages that have been studied in publications addressing the SDH are Basque and Japanese. As in child language acquisition research involving monolingual children, English is much more heavily represented than any other language: Of the total of 13 different language combinations listed in Table 2.1, 9 include English. Four of the combinations include French. The more language combinations show support for the SDH, the less likely the chance that evidence for the SDH is somehow a result of the specific languages investigated and the more likely the chance that the SDH indeed captures an important aspect of the bilingual acquisition process in general (see also De Houwer, 1994, p. 45).

It is often claimed that bilingual children reported on in the literature are primarily children of (psycho-)linguists (see, e.g., Romaine, 1999). Whereas this might have been the case in the past, it certainly no longer is today: Only 6 of the 29 children in Table 2.1 (viz., Andreu, Manuela, Natalie, Odessa, Sonja, and Zevio) are children of linguists or psychologists (viz., correspondingly, Pérez-Vidal, Deuchar, Stefánik, Jisa, Schelleter, and Krasinski). As in most studies of child language in general, the children studied primarily live in a middle class environment that, on the whole, is fairly common in the Western world (most of the children studied live in Western Europe and North America).

Most of the children listed in Table 2.1 have been exposed to their two languages according to the one person, one language principle. As discussed here, the SDH was originally formulated to apply only to children growing up in these circumstances. However, at least one child in Table 2.1 (Deuchar's daughter Manuela) quite clearly was not raised according to the one person, one language principle. Instead, Manuela's bilingual parents spoke English to her when there were other English speakers present and Spanish in all other circumstances. She heard English from monolingual English speakers.

Yet, she developed her two languages along two separate morphosyntactic paths as well.

Many studies listed in Table 2.1 analyzed data from the same children, but investigated different subtopics in morphosyntactic development (see below). Also, they do not always use data from the same age period, even though they may concern the same child. Most notable here are the many studies published by Meisel and his collaborators in the framework of the Hamburg DUFDE project (*Deutsch und Französisch—Doppelter Erstspracherwerb* [German and French—Double First Language Acquisition]; for overviews, see Köppe, 1994a, and Schlyter, 1990b). The children Annika, Caroline, Christoph, François, Ivar, Pascal, and Pierre were all studied in the framework of this influential project.

The studies in Table 2.1 investigated a wide variety of morphosyntactic subtopics. These subtopics are listed in Table 2.2 together with the studies that have a particular topic as their main focus. When studies concern more than one subtopic, they appear more than once in the table.

As discussed in the previous section, it is important to investigate all or most of the morphosyntactic elements used by a particular bilingual child in order to have firm evidence for the SDH. If the information from Tables 2.1 and 2.2 is combined, it is clear that for quite a few children in Table 2.1 many different morphosyntactic aspects have been investigated. This is particularly the case for the children Andreu, Caroline, Christoph, Kate, Ivar, Maija, Manuela, Mikel, Pascal, Pierre, Sonja, and Carlo (see also Serratrice, 1999, besides the publications listed in Tables 2.1 and 2.2). These children, then, were definitely approaching their two languages as fundamentally closed morphosyntactic sets. Whether the same can be said for the other children is yet to be determined; in any case, the

Table 2.2 Morphosyntactic Topics Investigated in Empirical Studies of Bilingual First Language Acquisition Confirming the Separate Development Hypothesis

Topic	Study/Studies
Morphology of the nominal constituent	Almgren and Barreña, 2000; Barreña, 1997; De Houwer, 1990; Ezeizabarrena and Larrañaga, 1996; Idiazabal, 1988, 1991; Koehn, 1994; Meisel, 1986; Müller, 1995; Parodi, 1990; Sinka and Schelleter, 1998; Stefánik, 1995, 1997; Stenzel, 1994, 1996
Syntactic gender	De Houwer, 1990; Müller, 1990a, 1994, 1995; Sinka and Schelleter, 1998; Stefánik, 1995, 1997
Pronouns/clitics	Almgren and Barreña, 2000; De Houwer, 1990; Kaiser, 1994; Müller et al., 1996; Serratrice, 2002
Determiners	Barreña, 1997; De Houwer, 1990; Müller, 1994; Paradis and Genesee, 1997
Pluralization	Barreña, 1997; De Houwer, 1990; Deuchar and Quay, 1998; Müller, 1994; Sinka and Schelleter, 1998
Verb morphology	Almgren and Barreña, 2000; Almgren and Idiazabal, 2001; De Houwer, 1990; Deuchar, 1992; Ezeizabarrena and Larrañaga, 1996; Jisa, 1995; Meisel, 1996; Meisel and Müller, 1992; Müller, 1990b; Paradis and Genesee, 1997; Serratrice, 2001; Sinka and Schelleter, 1998
Aspect and/or time markings	Almgren and Barreña, 2000; Almgren and Idiazabal, 2001; De Houwer, 1990, 1997; Jisa, 1995; Krasinski, 1995; Meisel, 1985, 1994; Mishina-Mori, 2002; Serratrice, 2001; Schlyter, 1990a, 1995
Congruence/agreement	Almgren and Barreña, 2000; De Houwer, 1990; Deuchar, 1992; Meisel, 1989, 1990, 1994; Meisel and Müller, 1992; Müller, 1990b; Paradis and Genesee, 1996; Serratrice, 2002; Sinka and Schelleter, 1998
Negation	Mishina-Mori, 2002; Paradis and Genesee, 1996, 1997
Syntactic word order	Almgren and Barreña, 2000; De Houwer, 1990; Hulk and Van der Linden, 1996; Köppe, 1994b; Meisel, 1986, 1989; Meisel and Müller, 1992; Müller, 1990b, 1993; Parodi, 1990; Sinka and Schelleter, 1998
Complex sentences	Barreña, 2001; De Houwer, 1990; Müller, 1993, 1994b
Subject realization	Juan-Garau and Pérez-Vidal, 2000; Serratrice, 2002
General development	De Houwer, 1990; Juan-Garau and Pérez-Vidal, 2000

remaining children show no signs of interlinguistically determined development in any of the areas that happen to have been investigated.

The fact that young, actively bilingual children essentially develop their two morphosyntactic systems separately from each other implies that one language may be further developed than the other. The children studied by Jisa (1995), Juan-Garau and Pérez-Vidal (2000), Schlyter (1995), and Stefánik (1995, 1997) (viz. Odessa, Andreu, Jean, Mimi, Anne, and Natalie), for instance, showed quite different language abilities for at least some time during the period they were studied. Most of the other children were at roughly the same level of development in each of their languages at the time of data collection (that is, if it is accepted that levels of development can in fact be meaningfully compared across languages, a point I am not so sure of unless the differences are blatantly obvious; see De Houwer, 1998).

Given the general lack of relevant data that could speak to this issue of uneven (but still separate) development, however, it is not clear what the range of possibilities here is: For instance, it is theoretically possible that a bilingual child produces complex sentences in one language while in the other language only two-word utterances appear. But are there any children growing up bilingual from birth who exhibit these sorts of patterns? So far, reports showing these kinds of divergent paths in skilled child speakers are lacking. The few studies that do show very differing levels of language ability across bilingual children's two languages (cf. above) happen to concern very young children who are just entering the multiword stage in one of their languages. Also, it remains to be investigated which factors determine gross differences across bilingual children's abilities in either language. In any case, it is a common observation that young bilingual children who have been regularly addressed in two languages from birth do not necessarily speak their two languages equally well.

Interlinguistic Influence in Unilingual Utterances

As suggested, even if a child is found to develop two morphosyntactic systems as fundamentally closed sets, occasionally the child may use unilingual utterances in language A that could well be explained as drawing on structural features of language Alpha. Such utterances will be nonadultlike, except when they are in fact modeled in the actual input to which the child is exposed (in which case the use by the child of structurally similar utterances is to be expected and as such not surprising or in need of special analytic treatment).

An example of such an utterance that might be a result of interlinguistic influence is "I want another," produced by my Dutch-English bilingual subject, Kate, at age 3 years (cf. also De Houwer, 1995b, p. 236). The pronominalizer "one" would have been expected here from an adult's perspective. Its nonrealization could be a result of simply insufficient, immature knowledge of the English system (i.e., a developmental explanation); after all, children often sound unlike adults because they omit a particular word or phrase. As it happens, Kate often used the pronominalizer one at around the same age in other (and similar) sentences, so this explanation might be less likely.

It should be noted, though, that it is typical for young children to show variability in their language use: For instance, at the same point of development, Dutch-speaking monolingual 3-year-olds may correctly say "*ik heb*" ("I have") and incorrectly *"*ik heeft*" ("I has") (De Houwer & Gillis, 1998). Alternatively, the utterance "I want another" might be considered a speech error. Or, the utterance might be explained by reference to Dutch (i.e., by influence from one language on another one), in which saying "I want another" but with Dutch words as in "*Ik* (I) *wil* (want) *een ander* (another)" is perfectly fine. Often, it will be impossible to choose between these three explanatory possibilities.

If potentially interlinguistically generated utterances of a similar nature are very rare on the whole, they are of little theoretical consequence: It will usually be impossible to verify their exact status with any degree of certainty, and because they are so rare, they will hardly be able to exert any lasting effects on the rest of the child's developing systems. So far, there has to my knowledge only been one study that has expressly looked at possibly interlinguistically generated utterances within a corpus of bilingual child speech, and that has published precise quantitative data regarding the frequency of occurrence of such utterances: Sinka (2000, p. 171) reported that in the corpus for her Latvian-English subject Mara, spanning nearly 1 year of data collection, only 2 (which is less than a tenth of a percent) of a total of 5,275 unilingual utterances were possibly cases showing interlinguistic influence on the syntactic level; for her second Latvian-English subject Maija, there were 13 (or less than a quarter of a percent) such utterances of a total of

5,537 utterances recorded in a year (Sinka noted that these utterances might in fact be performance errors). Clearly, with such small numbers, further analyses are quite pointless.

Bilingual and Monolingual Acquisition Compared

Already in the very first study of bilingual acquisition by Ronjat (1913), the question was raised how bilingual development compares to monolingual development (see also my summary of Ronjat's views in De Houwer, 1990, pp. 51–52). Ronjat complained that in effect he could not really address this issue in any detail since there simply were no sources for monolingual comparisons available. Since 1913, the situation has improved, although some of Ronjat's problems are still with us today (see below). The interest in comparing bilingual and monolingual development, however, has not changed.

Children who have been regularly and frequently exposed to two languages from birth and who actually speak those languages (not all bilingual exposure results in active bilingualism; see, e.g., De Houwer, 1999a) are no different from children growing up with just one language as far as the general course of morphosyntactic development is concerned. The main distinction between actively bilingual children on the one hand and monolingual children on the other is that the former are able to make themselves understood in two languages whereas the latter are not. Apart from this, there are no major differences. Both bilingual and monolingual children start off their conventionally meaningful language production using single-word sentences or *holophrases*. They then go on to produce two-word sentences, and after producing multiword sentences for a while, they start to use complex sentences as well.

On the morphological level, depending on the language that is acquired, both bilingual and monolingual children may use a number of bound morphemes at a very early stage in development. From the two-word stage onward, both monolingual and bilingual children speak a clearly identifiable language (for a critique of earlier theories that implicitly denied this as far as bilingual children are concerned, see De Houwer, 1995b).

Although young bilingual and monolingual children clearly speak a particular language from a very early age onward, they still differ quite dramatically from how the adults in their environment speak that language. Both bilingual and monolingual preschool children make morphological and syntactic errors, and they both produce only a fraction of the range of morphosyntactic devices available to mature speakers.

Further global similarities between bilingual and monolingual children concern the timing of a number of important milestones in language development. Except for the huge range of normal individual variation that exists between monolingual children (and which also exists among bilingual children), there are no systematic differences between normally developing bilingual and monolingual children in the ages at which basic language skills are acquired. Just like his or her monolingual friend, a bilingual 2-year-old can be expected to be able to carry on a brief, but largely comprehensible, conversation with a familiar adult using an occasional two-word utterance. A great deal more can be expected from a bilingual 3-year-old (just as can be expected of a 3-year-old monolingual): The child should be able to produce utterances containing three or four words and should be quite comprehensible to strangers.

There is as yet no empirical basis for the claim that, as a group, bilingual children develop their languages more slowly than monolingual children.

Finally, there are quite detailed similarities to be noted for bilingual and monolingual children concerning the developmental course of one specific language. In other words, if comparisons are made, for instance, of the English language use of a bilingual child and that of a monolingual child of approximately the same age, the similarities are quite striking. It is impossible to say on the basis of a corpus of English utterances by a 3-year-old whether they were produced by a bilingual or a monolingual child. Monolingual and bilingual children acquiring the same language from birth use that language in very similar ways: They produce the same sorts of utterances (some studies even reported identical utterances; see, e.g., De Houwer, 1990) with similar types of errors and characteristics.

Detailed comparisons between bilingual and monolingual children so far have been undertaken for Basque, Dutch, English, French, German, and Spanish. Obviously, it must not be forgotten that, in comparisons between bilingual and monolingual children acquiring a common language, there may be a great deal of variation between individual children. That individual variation makes it quite difficult in some cases to determine whether a small

point of difference is relatable to the fact that the bilingual child is simultaneously acquiring another language or not.

Future studies will have to show to what extent the minimal differences that do crop up here and there in very detailed comparisons are to be explained in terms of individual variation or other factors. One problem here is that often there is little material available for monolingual acquisition that could be used as a dependable basis for comparison (this problem sometimes occurs even for English, the most frequently researched language in acquisition studies). Another problem is that studies of spontaneous child speech often have few quantitative data, so that it is impossible to decide the extent of quantitative differences between monolingual and bilingual children in the frequency of occurrence of particular types of linguistic structures (for a more in-depth comparison of monolingual and bilingual acquisition, see De Houwer, 2002).

So far, I have mainly emphasized the similarities between the morphosyntactic development of bilingual and monolingual children. Those similarities highlight the robust nature of the primary language development process, which seems immune to whether a child is growing up learning two languages or just one. Note, however, that I have so far discussed bilingual children's morphosyntactic development only on the basis of a portion of their speech production (viz. on the basis of lexically and morphologically unilingual utterances). All young bilingual children, however, also produce lexically and morphologically mixed utterances (which, by definition, monolingual children cannot). It is these to which I turn next.

Structural Aspects of Bilingual Children's Mixed Utterances

Mixed utterances in bilingual speech are here defined as utterances with surface realization that clearly includes lexical items or bound morphemes (or both) from two languages (I leave aside the theoretical issue of the extent to which mixed utterances can be seen as instances of code switching or code mixing; for an in-depth discussion of this regarding young bilingual children, see, e.g., Lanza, 1997a). The very youngest of bilingual speakers use mixed utterances from the first stages of morphosyntactic development. The use of mixed utterances, then, is an integral part of early bilingual development, although on the whole, children's use of lexically or morphologically mixed utterances is rather infrequent in comparison with their use of lexically unilingual utterances (that is, for those children for whom we have data).

Switching between different types of utterances is apparently not a problem: To my knowledge, there have been no reports of bilingual children who had trouble switching between unilingual utterances from languages A and Alpha or vice versa or between unilingual utterances and mixed utterances. The use of far more hesitations in one language than another, though, might give rise to less-fluent transitions from one type of utterance to another. In my study, the only one I am aware of that counted a bilingual child's (Kate's) hesitations and analyzed their use in both languages (De Houwer, 1990, pp. 96, 331), I found no differences between the languages. In the absence of evidence to the contrary, fluent switching between different types of utterances seems to be part and parcel of early bilingual production in children raised with two languages from birth.

Parents in bilingual families are sometimes surprised to hear their young children use mixed utterances, especially when they see themselves as not using mixed utterances (however, as Goodz (1989) has shown, for instance, there may be quite a difference between self-reported and actual language use in bilingual situations). Often, parents (and in the past, researchers as well) see the use of mixed utterances by their young bilingual children as evidence of language confusion. As Lanza (1997b) admirably demonstrated, young bilingual children's early use of mixed utterances cannot be seen as a result of "language confusion," but can be explained by the language socialization practices in the family and children's sensitivity to them. Young bilingual children are in general very responsive vis-à-vis the sociolinguistic norms that exist in their environment regarding language choice (see, e.g., De Houwer, 1990; Deuchar & Quay, 2000). Also, the use of mixed utterances can be explained in terms of this sensitivity: Children will use more mixed utterances, and will continue to use them, the more tolerance there is for them in their environment. The use of mixed utterances, then, is in most cases not reducible to a lack of language skill.

There have been only a few studies of bilingual children's morphosyntactic development that have both looked in detail at lexically unilingual and mixed utterances produced by the same child and have tried to draw comparisons between them (De Houwer, 1990; Sinka, 2000). The general picture gained from these studies is that the structure of mixed utterances tends to reflect the overall

structure of lexically unilingual utterances produced by the bilingual child at the same age: Both the global length and linguistic complexity of mixed utterances resemble those of the unilingual utterances the child is producing at the time.

There have been rather more studies of bilingual children's mixed utterances per se, although again the number of studies focusing on their morphosyntactic characteristics is limited. Because young bilingual children are still quite immature speakers, they will often produce very short utterances consisting of just two words. For these, it will be impossible to investigate which elements are mixed into what (cf. De Houwer, 1990, 1995a; but see Lanza, 1997b, for an alternative view). For longer mixed utterances, it may be possible to identify the consistency of the mixed elements.

The empirical data available so far, regardless of the particular language combination studied (see, e.g., De Houwer, 1990, 1995a; Saunders, 1988; Sinka, 2000; Wanner, 1996) show that, in utterances that clearly are utterances in language A with one or more elements inserted from language Alpha (or vice versa), the insertions from language Alpha mainly consist of single nouns when children are under age 4 years (at a somewhat later age, insertions mainly consist of noun phrases in addition to single nouns; cf. Bentahila & Davies, 1994). Also, in bilingual adults, noun insertions are the most commonly inserted category in mixed utterances (see, e.g., Romaine, 1995).

In De Houwer (1995a), I applied an analytical method based on utterance length and guest and host language status to mixed utterances produced by 11 preschool children acquiring five language combinations. The data for this study were drawn from the spoken language corpora archive CHILDES (MacWhinney, 1991) as well as from several published sources. The main finding was that, regardless of the actual language pair involved, children's mixed multiword utterances consisted mainly of free morpheme insertions of the guest languages into the host language. These free morpheme insertions were most often nouns.

More analyses that apply one specific method for cross comparisons are needed, however, to obtain a clearer picture of the main characteristics of young bilingual children's mixed utterances.

Conclusion

In acquiring two languages from birth, children are undergoing a sort of "double" acquisition process in which two morphosyntactic systems are acquired as fundamentally separate and closed systems. This does not imply, of course, that structural influence from one language on the other is not possible, but until now no evidence has been found of systematic morphosyntactic influence from one language on the other in children who have been regularly and frequently exposed to two languages from birth. Young bilingual children reflect the structural possibilities of both languages to which they have been exposed and are able to produce utterances that are clearly relatable to each of their different languages from very early. This would not be possible without very close attention to the variable nature of the input (De Houwer, 1990).

In general, bilingual children's language-specific development within one language differs little from that of monolingual acquisition, except of course that bilingual children do it for two languages at a time. There is no evidence that hearing two languages from birth leads to language delay.

In being able to produce unilingual utterances in two languages, bilingual children closely resemble bilingual adults. In addition, just like adult bilinguals, young bilingual children are able to switch between languages very easily, either at utterance boundaries or within utterances. Utterances in which lexical or morphological switching occurs are an integral mark of bilingual functioning both in young child bilinguals and in more mature bilingual speakers. In mixed utterances produced by either child or adult bilinguals, noun insertions are a common feature. Naturally, though, in both mixed and unilingual utterances, child bilinguals do not yet exhibit the full wealth and breadth of the sorts of structures of which adult bilinguals are capable.

As they acquire two separate linguistic systems, young bilingual children learn from a very tender age which norms for language choice exist in their environment, and in general they are able to apply those norms in their own language production. The use of mixed utterances is to be seen as one of the language choice possibilities within the socialization patterns present in bilingual children's linguistic environments rather than as a sign of insufficient linguistic skill.

It is clear, then, that young bilingual children are very much attuned to the specific linguistic environment in which they find themselves, and that they are very much influenced by this environment. The real challenge for explaining bilingual development is to discover the precise links between that environment and bilingual child language use.

Acknowledgments

Many thanks to the editors and to Wolfgang Wölck of the State University of New York, Buffalo, for very helpful feedback on a draft version of this chapter. I also thank Hugo Baetens Beardsmore for confirming that Ronjat's (1913) study was the first empirical study on bilingual behavior.

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