from understanding spoken and written words to comprehending text and producing discourse. The book also considers aspects of second language acquisition and specific consequences of bilingualism for cognition and for special circumstances in which access to language is constrained, for example in the deaf and in aphasics who were previously bilingual. Although we anticipate that some readers will wish that other topics and other emphases were included, we believe that the scope of this volume represents a fair sampling of the most exciting contemporary psycholinguistic research on this topic.

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The past 15 years have witnessed an increasing interest in the cognitive study of the bilingual. A major reason why psychologists, psycholinguists, applied linguists, neuropsychologists, and educators have pursued this topic at an accelerating pace presumably is the acknowledgment by increasingly large numbers of language researchers that the incidence of monolingualism in individual language users may be lower than that of bilingualism. This alleged numerical imbalance between monolinguals and bilinguals may be expected to become larger due to increasing international travel through, for instance, tourism and trade, to the growing use of international communication networks, and to the fact that in some parts of the world (Europe), the borders between countries are effectively disappearing. The statement that bilingualism, rather than monolingualism, is more the norm is particularly persuasive if one adopts a definition of bilingualism that covers not only balanced bilinguals, of which there may be relatively few, but also unbalanced forms, where one of the languages dominates the other. For a long time, the opposite view of bilingualism as a rather exceptional human state has been entertained. A likely reason for this may be that the United States, where the majority of language researchers reside, represents a prototypical bilingualism-as-exception culture. Students attending public high schools are typically required to take foreign language classes but rarely become fluent, and outside of urban settings with a strong minority language presence, there is little opportunity to use languages other than English. English and monolingualism are thus the norm.
In addition to the growing awareness that bilinguals are very common and may even outnumber monolinguals, there is the dawning understanding that the bilingual mind is not simply the sum of the cognitive processes associated with each of the two monolingual modes, and that the two languages of the bilingual may interact with one another in complicated ways. To gain a genuinely universal account of human cognition will therefore require a detailed understanding of language use by both pure monolinguals as well as bilinguals, unbalanced and balanced, and of the representations and processes involved. That the study of bilingual cognition may lead into muddier waters than that of monolingualism, for instance because the bilingual population is rather heterogeneous in terms of factors such as age of acquisition and proficiency of the second language, and the large number of pairwise combinations of the world's languages involved (estimated at 4,000; Comrie, 1989), should therefore not be a reason to ignore it (see Cook, this volume).

These two insights, that bilingualism is a common human condition and that it may influence cognition, were presumably instrumental in putting bilingualism on the agendas of many researchers of cognition and language in recent years. But other reasons may have played a role, too: The study of bilingualism also provides a unique opportunity to study the relation between language and thought. The Sapir-Whorf hypothesis, that language determines thought, has typically been investigated across speakers of different languages. If the hypothesis holds, an interesting question is whether the thought processes of one and the same bilingual person respond to the language he or she is using at a particular moment in time. For instance, does a French–English bilingual think and feel (more) "French" when speaking French and vice versa, or does this person think and feel the same irrespective of the language used? In the latter case the selection, consciously or unconsciously, of one language over the other at a particular point in time may merely reflect the fact that this bilingual regards that language particularly well suited to express what was on his or her mind. Or, the choice of language may reflect a subtle interaction between the individual's cognitive processes and cues available from the external context.

A final reason for the growing interest in this area of research is the awareness that bilingualism may confer the benefit of broadening one's scope beyond the limits of one's own country and culture. To increase the accessibility of bilingualism to individuals where the culture does not historically support multiple language use, the details of the nature of bilingualism have to be understood and therefore studied thoroughly. With a few carefully chosen additional languages, one's range of action may expand immensely. The statement can be substantiated most clearly by pointing at the English language, estimated to be the mother tongue of 350 million people, the second language of many more, and the principal and/or official language of well over 30 countries, large and small (Katzner, 1986). In other words, both in terms of number of people that speak it and in terms of countries in which it is spoken, its coverage is immense.

This book constitutes our contribution to this field of study. It is divided into three sections: Part 1, Second Language Acquisition; Part 2, Representation, Comprehension, and Production in Two Languages; and Part 3, The Consequences of Bilingualism for Thought and for Special Forms of Language Processing. The first chapter, by Harley and Wang, reviews the literature on the "critical-period hypothesis," which holds that children have a special ability to acquire languages. The fact that this view is widespread among the general public does not necessarily mean that it is correct. Indeed, among second-language researchers it constitutes an ongoing point of contention, and even among those researchers who accept the main tenet of the hypothesis there is much uncertainty about the details of many of its components (e.g., What are the relevant age limits? What aspects of language are concerned?). Harley and Wang organize their discussion around five reference points that can be used to find out whether the more general notion of a critical period for a particular type of behavior can be applied to language acquisition: A critical period must have an onset, an offset, an intrinsic maturational component, an external component, that is, a stimulus to which the organism is sensitive, and finally, a system that is affected by stimulation during the critical period (Colombo, 1982). The authors' first step is to analyze in detail Lenneberg's (1967) proposal regarding the critical period hypothesis for language on these five components. A central aspect of Lenneberg's theory is that puberty marks the offset of the critical period. Beyond this critical boundary language is not learned naturally anymore, says Lenneberg, but has to be taught and learned through conscious and labored effort. Another central component is that this natural learning within the critical age range is driven by an innate mechanism which is dedicated to language and operates independently of more general cognitive processes. These are the aspects of Lenneberg's theory that have been focused on in much of the ensuing work on first- and second-language acquisition, and there appears to be little consensus on them. This lack of consensus also surfaces in the present volume, where MacWhinney (chapter 4) explicitly opposes the notion of an innate mechanism dedicated to language and driving language acquisition. The main body of Harley and Wang's chapter concerns a review of the empirical data on the critical-period hypothesis, again organized around the five aspects already mentioned. Toward the end of their analysis the reader cannot help concluding that the firm belief of the general public that children are privileged when it comes to learning languages is not based on extremely solid empirical ground. A number of questions concerning even the most basic aspects of the hypothesis do not appear to be definitely settled. Even the central point that puberty constitutes
a turning point in language acquisition remains a point of contention. It
seems that much further work is required if we are to understand the exact
relationship between age of acquisition and skill in using languages, both
native and foreign, and the sources of this relation.
Ellis and Laporte (chapter 2) address the question, What are the best
ways of helping learners acquire a certain level of proficiency in a second
language (L2)? A salient dimension on which the methods that have been
used in the past can be distinguished is the role played by consciousness
in the acquisition process. Some of the methods instancing a view of L2
learning as a deductive process in which conscious knowledge is exploited;
others regarded it as an implicit, unconscious, inductive process. The former
type of method has stressed the teaching of formal rules of L2, typically
syntactic rules, whereas comprehensible input was considered particularly
relevant by the developers of the latter type. Because L1 develops without
explicit training of rules, a conclusive finding that formal rules need to be
taught in order to attain proficiency in L2 would provide a strong indication
that L1 and L2 acquisition proceed in fundamentally different ways. A number
consciousness in L2 acquisition: Does knowledge acquisition, here regarding
explicit instruction may facilitate the learning process: Is it by focusing at­
tention on the structural patterns in the input while preventing output prac­
tice (Question 4) or by output practice (Question 5)? The data from field
and laboratory studies alike suggest that both the former and the latter play
a role in L2 acquisition.

The scope of chapter 3, by Segalowitz, is a very broad one. His goal is to
inform his audience on the reasons why individual L2 users differ so much in
the proficiency level that they attain ultimately. The most robust conclusion
the reader can draw from Segalowitz’ exposition is that many factors, interact­
ing in intricate ways, contribute to ultimate attainment. Age-of-acquisition
and instruction method, the topics of the previous two chapters, constitute just two
of a much larger set of factors that may be involved. Segalowitz organizes his
discussion of this vast topic in four sections. The first is concerned with
individual differences from the perspective of research on second language
acquisition. In his discussion of this work, Segalowitz adopts a framework
employed by Ellis (1994) that distinguishes between “individual learner
differences” such as age, aptitude, and motivation, “learner strategies,” and
“language learning outcomes.” Regarding the factor of age, Segalowitz’
conclusions agree comfortably with those drawn by Harley and Wang and
need not be repeated here. A relevant question to pose with respect to aptitude
is whether such a thing as talent for learning languages exists, independent of
general intelligence. A main focus in the learner-strategies studies is on the fit
between a particular language-learning environment and the way the learner
approaches this environment. Finding the best match between these two may
enhance learning; mismatches may hamper learning. Finally, a role of learning
outcomes in individual differences may be expected because the perceived
outcome of a communicative interaction in L2 (Was it successful or not?), is
likely to affect the extent to which the learner will seek further opportunities
to use L2. In the second section of his contribution, Segalowitz applies the
information-processing model of individual differences in the acquisition of
any skill as developed by Ackerman (e.g., Ackerman, 1987) to L2 learning. The
model posits three stages in skill acquisition, each of which requires a unique
set of skills if performance in that stage is to proceed smoothly. As a
consequence, different abilities will be implicated in individual differences in
each of the three stages of learning. Applied to skill acquisition in L2, the
holds both for explicit knowledge derived by the learners themselves and
for explicit knowledge taught through instruction. But the roles of explicit
learning and instruction in L2 knowledge acquisition are not straightforward
in that they respond to aspects of the input (e.g., is it structured or not?)
and to the method of instruction (e.g., are the rule statements clear?). Nev­
nevertheless, the authors conclude that a blend of explicit instruction and implicit
learning can be more effective than either of the two on its own. The final
two questions posed by Ellis and Laporte look at specific ways in which
explicit instruction may facilitate the learning process: Is it by focusing at­
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each of the three stages of learning. Applied to skill acquisition in L2, the
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proper question to ask is not "What causes individual differences in L2 performance?" but "What causes individual differences in L2 performance at particular stages of L2 acquisition?" The question Segalowitz poses in his third section is whether there is a neuropsychological basis for individual differences in language learning and for exceptional language-learning ability. Some indications in the literature on exceptional abilities in general suggest an affirmative answer. In his final section, Segalowitz presents a framework that combines many of the elements of the second-language-acquisition, information-processing, and neuropsychological approaches to individual differences in L2 learning discussed before. A central component of this unifying framework is that the L2 user should approach natural language situations in a way that acknowledges a number of basic characteristics of natural language and the situations in which it is used, for instance, that during natural language conversation the environment changes continuously and that every further state of the environment affords new actions on the part of the interlocutors. An L2 user who does not approach L2 communicative situations this way may perform suboptimally.

A central assumption in much of the work on the critical-age hypothesis (chapter 1) is that first- and (late) second-language learning proceed in fundamentally different ways: First-language learning may be subserved by an innate mechanism and proceed "naturally" and implicitly, whereas second-language learning beyond the critical period may be laborious and require conscious, explicit analysis (cf. chapter 2). In the final chapter of Part 1 (chapter 4), MacWhinney proposes a radically different view of language learning, the competition model. He rejects the idea of a biological mechanism supporting the learning of any language, including the first. Instead, he adheres to a view that emphasizes the role of input. From language input the learner gradually derives a system of form-to-function mappings that enables skillful performance in that particular language. During language comprehension a number of forms are activated that compete for mapping onto a set of functions. Conversely, during language production a number of functions are activated that compete for mapping onto a set of forms. The competition model uses a connectionist architecture to model the form-to-function mappings. This type of architecture assumes that all mental processes exploit a common set of cognitive structures. Among the properties that fall out of this organization is one that is of particular interest for second-language learning, namely, transfer: The competition model predicts massive transfer from L1 during L2 acquisition, on all levels of language processing (e.g., phonological, lexical, and grammatical). MacWhinney describes L2 learning as a process completely parasitic on L1. Through various types of processes, L2 gradually becomes independent of L1. For instance, due to continued L2 exposure, the L1 and L2 lexicons are separated out over time, by the creation of direct connections between L2 forms and meanings on the one hand and through restructuring of word meanings on the other hand. MacWhinney provides many examples of transfer from L1 to L2 that can be observed in the language behavior of L2 learners, focusing on grammatical transfer. Even though the model was originally developed to account for L1 processing, it does a good job accounting for many of the manifestations of an L1 "accent" (evidence of transfer) in learners' use of L2 as well. Data from a substantial number of sentence-interpretation studies suggest that the L2-learner starts the acquisition process by setting the weights of the L2 form cues (such as preverbal positioning and sentence-initial position as cues for the function of agent) close to those for L1. With continued L2 exposure the settings gradually change towards those adopted by native speakers of L2, although the exact settings of native speakers may not always be attained (as is evident from the occurrence of tenacious grammatical accents).

The contributions in Part 2 all deal with the representation and use of two languages in bilinguals. Comprehension is covered somewhat more completely than production, reflecting the uneven research efforts in these two areas of bilingual language use. The issue of representation crops up in most of the chapters in this section, some of them focusing on the representation of word knowledge (Smith; Kroll & De Groot), whereas other chapters have a wider scope (Poullisse; Grosjean). A central question regarding representation in bilinguals is whether the bilingual's word knowledge is represented in two language-specific systems or in one language-independent system. In spite of considerable research efforts covering a couple of decades, this question has never been resolved conclusively. However, it appears that substantial progress has been made from the moment the awareness arose that word representations should not be regarded as monolithic constructions but as composites instead: Their content should be split across (at least) two layers of representation, one layer representing the forms of words and a second representing their meaning. Representational models assuming such a layered structure are often called "hierarchical." The focus in the chapters by Smith (chapter 5) and by Kroll and De Groot (chapter 6) is on the bilingual versions of such hierarchical models, and this type of model is also common in the literature on bilingual speech production (chapter 7).

Chapter 5 lays the groundwork for chapter 6 in that Smith reviews the empirical support for the bilingual hierarchical model, which Kroll and De Groot take as their starting point. The first step in Smith's analysis is to scrutinize monolingual studies on findings that evidence a separation between form (or "lexical") and semantic information. The crucial support comes from studies that demonstrate dissociative effects of lexical and semantic factors in various tasks. The next step is to find out whether or not, at the form level of representation, the language systems of the bilingual are (functionally) separated. On the basis of both neuropsychological and behavioral data Smith
concludes that form representations indeed appear to be language specific. These two steps combined inform us on the various memory stores a model of bilingual memory should contain, yet it says little about the ways these stores connect with one another, a point that is elaborated on in the chapter by Kroll and De Groot. A further topic in Smith's contribution is how the bilingual memory system, the components of which have just been laid out, is accessed: Is lexical access language-specific or language-independent? In other words, does a stimulus selectively activate the lexicon of the appropriate language, or does it activate both lexicons simultaneously? Empirical data from various sources (e.g., interlingual Stroop studies and studies investigating the processing of interlexical homographs) converge on the conclusion that lexical access is language independent, although under a number of narrowly circumscribed conditions language-specific access may occur. Parts of the later chapters by Kroll and De Groot and by Grosjean speak to this same issue and arrive at similar conclusions.

Whereas Smith identifies the memory stores in bilingual memory, Kroll and De Groot (chapter 6) discuss the support for the various views on how the stores are connected and what the implications are for bilingual word processing, more precisely, for the way forms are mapped to meaning and vice versa. They begin their review with a discussion of a number of different versions of the hierarchical model introduced in Smith's chapter. Common features of these models are that they contain two levels of representation, one for word forms and one for word meanings, and that the word-form level contains two memory stores, one for the L1 words and a second for the L2 words. Instances of this type of model are the "concept mediation" model, the "word association" model, and the "revised hierarchical" model. The former two of these models were reintroduced in the recent literature on bilingual memory representation by Potter, So, Von Eckardt, and Feldman (1984), in a paper that boosted current research efforts in this area. The word-association model assumes direct connections between the word-form representations and the corresponding representations in conceptual (meaning) memory. Conversely, the concept-mediation model postulates the latter type of connections but not the former. A consequence of a word-association organization is that processing of L2 is mediated via L1. In contrast, given a concept-mediation memory organization, L1 and L2 are processed in exactly the same way. A "developmental" model has been proposed that assumes a word-association organization in bilinguals with a low level of proficiency in L2, and a concept-mediation organization for the higher levels of fluency. This idea agrees with MacWhinney's view (chapter 4) that L2 acquisition progresses from a stage of parasitic use of L1 to a stage where L2 functions independently from L1. The revised hierarchical model is a more recent instantiation of this general class of models. Its unique feature is that it assumes directionality and differential strength of the connections between the memory stores. As a consequence of the resulting asymmetries in the memory structures, the processing of L2 words is mediated via L1 word-form representations, whereas L1 words access their meaning representations directly. A further recent qualification of the general hierarchical model is the "conceptual feature model," which posits "distributed" meaning representations: The meaning of a word is no longer represented in a single node in conceptual memory but spread out over a number of more elementary nodes, each of which represents one component of the word's meaning. Kroll and De Groot review the empirical support for each of these models and discuss results that pose a challenge to them. They conclude their contribution with an outline of a new model, again based on distributed representations, but now both at the form level and at the meaning level. Another new aspect is that this model contains an additional level of representations, namely, a level of language-specific lemma representations. Such a lemma level is a common part of the models of bilingual language production discussed by Poulisse in the next contribution (chapter 7).

In the psycholinguistic study of language use, language comprehension has received much more attention than language production. This imbalance is especially large in research on bilingualism. Poulisse reviews the sparse literature on speech production in bilinguals, with a focus on studies that deal with the entire production process, all the way from conceptualizing the message to articulating it. In monolingual work on speech production, two competing types of models are common: the interactive-activation models, which allow communication between the various processing components of the complete production process, and those that assume autonomy of the processing components. The bilingual production models discussed by Poulisse mostly derive from one of the latter type of models, namely the model proposed by Levelt (1989). This model splits up speech production into four stages, which together are taken care of by three processing components: a conceptualizer, a formulator, and an articulator. In Levelt's model, unlike in much of the bilingual-representation work reviewed in chapter 6, a lexicon is assumed that, in addition to word forms and word meanings, also specifies syntactic and morphological information: A "lemma" representation contains the semantic and syntactic information, whereas a "lexeme" specifies the morphological and phonological information. In her discussion of the L2 production models that stem from Levelt's model, Poulisse highlights the question of how each of them accounts for the fact that L2 speech, especially that of beginning learners (cf. MacWhinney, chapter 4) contains L1 code-switches, some intentional and some accidental. In addition to explaining code-switches, any model of bilingual speech production should be able to deal with the fact that most of the time bilinguals, when intent on speaking only one language, are quite successful in keeping their
two languages apart. An explanation of these phenomena in terms of a "language switch" seems to be out, as is also indicated by the position taken by a number of the other contributors to this present volume (e.g., Grosjean, chapter 8). A more contemporary account of code switching and language separation is in terms of the idea that the language system of a bilingual is organized in two subsets, one for each language. These two subsets can be selectively activated, or activated simultaneously to various degrees (see also Grosjean, chapter 8, and Paradis, chapter 12). The latter state of affairs gives rise to code switches. This notion of subsets is taken up in a number of the bilingual production models discussed by Poulisse. Another idea that features in several models is that word meaning is built up from a number of more elementary meaning components. This idea was introduced earlier, in our preview of chapter 6. But presumably the most noteworthy aspect of the models that Poulisse discusses is their large degree of similarity, which suggests that we already know a great deal about language production in bilinguals. This may, however, be more apparent than real, since the similarities may merely be due to the fact that the majority of the L2 production models have taken one and the same monolingual production model (Levelt's serial model) as their starting point. It would be interesting to see if and how monolingual interactive-activation models could be adapted such that they would cover L2 language production. In chapter 8, Grosjean presents a model of that type.

Like Poulisse, Grosjean focuses on the phenomenon that bilinguals can mix their two languages and indeed often do so, either intentionally or accidentally. He uses the term mixed language to cover both "code-switches," which involve complete switches from the base language to the guest language, and "borrowings," or switches that are incomplete in that the guest-language units are partly (e.g., phonologically and morphologically) adapted to the base language. Whereas Poulisse primarily discusses the occurrence of language switches in natural speech, Grosjean demonstrates that they can be induced experimentally, and to varying degrees depending on the specific experimental circumstances. The underlying source of this variability in the amount of language mixing is the "language mode" the bilingual subjects are in: monolingual, bilingual, or anywhere else on the continuum between these two extremes. Bilinguals operate in the monolingual mode when, for instance, communicating with a monolingual interlocutor (or, as the experimental data show, when they imagine communicating with a monolingual person); bilinguals operate at the bilingual end of the continuum when, for instance, interacting with people with whom they share their two languages. The incidence of switches to the guest language is larger the more the bilingual operates towards the bilingual end of the continuum. According to Grosjean, knowing the position on the continuum that the bilingual is at when he or she performs a given task is of utmost importance if one is to interpret correctly his or her behavior on that task. A couple of central issues in bilingualism research, such as the debate about language-specific versus language-independent representation and about selective versus nonselective lexical access (see chapters 5 and 6), cannot be resolved, he argues, without knowing about the participants' language mode in the relevant studies. Adopting a particular position on the language-mode continuum is associated with particular levels of activation of the base and guest language. Like the originators of a number of the L2 production models discussed by Poulisse, Grosjean adheres to the view that the language system of the bilingual is organized in two subsets that can be activated and deactivated independently of one another, at least within certain limits, or activated simultaneously, each to a particular degree. In the monolingual mode the guest language is deactivated as best as possible, and, as a consequence, does not intrude upon the base language very often. In the bilingual mode the guest language is activated to a relatively high level (but less so than the base language), giving rise to many intrusions. So, in a way, the language mode chosen and the relative degree of activation of the base and guest languages can be regarded as the ultimate and proximate causes, respectively, of the amount of language mixing that takes place in the speech of a bilingual. Grosjean substantiates these theoretical notions with empirical data from both production and comprehension studies and proposes an interactive-activation model of bilingual language processing that can readily account for the data. This model incorporates, but now in an interactive-activation architecture, the "subsets" notion of the language system as one extended system containing two subsystems, one for each of the bilingual's two languages.

In the last chapter of Part 2 (chapter 9), Durgunoglu reviews work on bilingual reading, emphasizing the higher levels of the entire reading process, such as syntactic analysis, sentence comprehension, and the role of prior knowledge in bilingual reading. Reading in L2 has much in common with L1 reading, but it has unique features as well. Therefore, Durgunoglu argues, L2 reading should constitute a separate field of research. The author organizes her discussion around three sources of knowledge that affect reading in both L1 and L2: linguistic and metalinguistic knowledge, literacy knowledge, and prior knowledge. The first of these three knowledge sources concerns variables that affect both listening and reading comprehension, such as syntactic and vocabulary knowledge and metalinguistic knowledge regarding the structural characteristics of language. The second of the relevant knowledge sources, literacy knowledge, concerns knowledge sources that are specific to reading, such as the knowledge underlying the decontextualized nature of written language material and the knowledge that enables the exploitation of what are called "good meaning-making strategies," especially those that are unique to reading. The role of the third relevant source of knowledge in reading comprehension, prior knowledge, has long been
acknowledged: The more readers know about the topic of the text, the better their comprehension of that text. The contribution of this factor may be boosted in L2 reading, because readers may lack the relevant cultural background knowledge. Durgunoglu concludes her contribution with a discussion of a number of issues that are specific to reading in L2. A central topic in this section concerns the question of what causes problems in L2 reading comprehension: limited literacy in L1, sufficient L1 literacy but a failure to transfer it to L2 reading (cf. MacWhinney, chapter 4, who discusses the role of transfer in relation to both oral and literacy development in L2), limited linguistic knowledge of L2, or a bit of all of these. One of the remaining issues addressed in this last section is how the specific nature of the environment causes the learning of a second language to have a beneficial or a detrimental effect on cognitive functioning. This particular topic, the cognitive implications of bilingualism, is highlighted by Cook in the next chapter.

In the first chapter of Part 3 (chapter 10), Cook addresses the question of what effects bilingualism may have on cognitive processing. This question has been tackled from two opposite perspectives, introduced earlier: that monolingualism is the norm and bilingualism the deviant state (the "monolingualist" view), and, conversely, that bilingualism is the norm with monolingualism constituting the abnormal constitution (the "multilingualist" view). A monolingualist view per se does not yet specify the direction of the deviation in the case of bilingualism: It may be negative, where being a bilingual means there is something to be lost (the "subtractive" view); it may be positive, where benefits are associated with bilingualism (the "additive" view); or both may be the case, with the gains and losses bearing upon different aspects of cognitive functioning. Cook organizes his discussion of the work relating to the monolingualist view in two sections. The first of these covers the studies that provide support for the subtractive view; the second deals with work that substantiates the additive view. To start with the former, one of the robust findings turns out to be that bilinguals use their L2 more slowly than native speakers of that language do. This, of course, comes as no surprise, and cannot really be considered "subtractive" in the proper sense of the word, because, whatever the level of their skill in using L2, the fact that they can use it to at least some extent may be considered a benefit as compared to a pure monolingual state. More pertinent to this issue is whether being able to use a second language has a detrimental effect on the use of L1. Some empirical support for this idea exists. Furthermore, there are data suggesting that bilinguals' short-term-memory and working-memory capacities are smaller in L2 than in L1 and that their long-term memory of text presented in L2 is impaired as compared to that of text presented in L1. But again, this per se does not point at a deficit in bilinguals as compared to monolinguals; only a finding that the short-term-memory and working-memory capacities of bilinguals, especially in their L1, were smaller and/or that their long-term memory was worse than the analogous values observed for monolingual speakers of that language, would support the notion of a deficit. In his discussion of the additive monolingualist view, Cook focuses on the alleged greater metalinguistic (e.g., phonological and grammatical) awareness of bilinguals as compared to monolinguals (see also chapter 9 by Durgunoglu). This may, for instance, lead to a more precise choice of words. In addition, there are some data that indicate a higher degree of cognitive flexibility in bilinguals than in monolinguals. But overall, both the cognitive losses and the cognitive gains that may be associated with bilingualism appear to be quite modest and, as Cook concludes, the deficits have to be balanced by the enormous gain of being able to use a second language and, through that language, to become familiar with a culture different from one's own. He finishes his discussion by elaborating on two important new insights, also alluded to in a number of other chapters in this book as well as earlier in this introduction: that it is not monolingualism that is the common human state but instead multilingualism (see, e.g., Paradis, chapter 12) and that bilinguals should not be regarded as two monolinguals in one and the same person but as language users in their own right, whose performance should not be assessed against that of monolinguals (see, e.g., Harley & Wang, chapter 1, and Grosjean, chapter 8).

In chapter 11, Dufour takes up the challenge to tread beyond the common view of bilingualism as a state in which an individual has a certain level of command over two spoken languages. If, as is indeed generally acknowledged, sign languages are full languages in their own right, the study of bilingualism should encompass language combinations in which at least one of the languages involved is a sign language. In his contribution Dufour reviews the few studies that have addressed the psycholinguistics of sign-language bilingualism. This topic of study is not only interesting in itself, but may also be expected to inform theories of bilingualism based on studying combinations of spoken languages. The approach adopted by Dufour fits in with this latter potential of the bilingual study of sign languages. It takes as a starting point a generic hierarchical model of bilingual memory representation, developed on the basis of work on spoken-language bilingualism (see Smith, chapter 5, and Kroll & De Groot, chapter 6), and then poses the question of whether and to what extent this model may also hold for one or more of the various types of sign-language bilingualism that can be distinguished. Dufour differentiates between three such types and organizes his discussion of the literature around these three: "sign-sign" bilinguals, whose bilingualism consists of a sign language as L1 and a second sign language as L2; "speech-sign" bilinguals, who are proficient in a spoken language as L1 and later acquire a sign language as L2; and "sign-text" bilinguals, with a sign language as L1 and only the written form of a spoken language as L2. On the basis of a small set of pertinent studies, Dufour derives the outlines of a number of models of memory representation, often
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task-specific, that may be associated with sign-language bilingualism. The
different memory structures that he considers are all versions of the familiar
class of hierarchical models of representation, but they differ from one an-
other in subtle ways. The differences between them account for the distinc-
tions among the preceding three types of sign-language bilingualism. As a
final step in his analysis, he combines the common characteristics of the
proposed versions into one generic model of sign-language bilingualism
and compares this standard model with a number of versions of the hier-
archical model developed to account for spoken-language bilingualism. A
few indications of possibly critical differences between memory repre-
sentation in spoken- and sign-language bilingualism emerge from this com-
parison. Hopefully, this analysis will stimulate further work in this neglected
area of research.

In the last contribution to this volume (chapter 12), Paradis integrates the
literature on the cognitive neuropsychology of bilingualism into an analysis
that leaves the reader with the reassuring feeling that many findings in this
intriguing field of research are not that puzzling after all. As noted by Paradis,
much of the literature on the neuropsychology of bilingualism has concen-
trated on explaining the various recovery patterns in aphasic bilinguals. Such
patients may recover both languages to the same extent and in parallel, but
it may also be the case that only one of the languages recovers whereas
the other seems to be lost permanently, that one language recovers before
the other, or, most astonishing, that the two languages are available alter-
nately. If one adheres to the view that different languages are represented
in systems that are neuroanatomically separated in the brain, and that these
different brain areas may be selectively destroyed in aphasia, particularly
the latter type of bilingual aphasia would be hard to explain. Such a state
of affairs would seem to force the highly implausible conclusion that at odd
times the languages of a patient of this type switch positions in the brain
between the damaged and nondamaged areas. In contrast, if one conceives
of the bilingual's two languages as systems that are only neurofunctionally
independent, all of the preceding recovery patterns can be accounted for.
This is the position favored by Paradis: Both of a bilingual's two languages
are represented, as two language-specific subsystems of a larger system, the
language system, in the language areas of the left hemisphere. The two
subsystems can be selectively activated and deactivated or inhibited, a view
that we have become familiar with in some of the other chapters, in particular
those dealing with code switching (Poullisse, chapter 7, and Grosjean, chapter
8). In addition to the two language-specific subsystems that together con-
stitute the language system, there is a third, language independent, system
that stores conceptual information. The general form of this "three-store"
model is reminiscent of the models of bilingual memory presented by Smith
(chapter 5) and Kroll and De Groot (chapter 6), but the reader should be

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aware that Paradis' model differs from the latter in a couple of crucial re-
spects: In the latter class of models the language-specific representations
only specify word forms, and word meanings are assumed to be stored in
conceptual memory. In other words, no distinction is made between seman-
tic and conceptual information. In contrast, Paradis' language-specific stores
contain entities that specify both word form and word meaning, whereas
the third, language independent, system represents conceptual information.
We have seen this explicit segregation between semantic and conceptual
information before in this volume, namely in most of the bilingual production
models presented by Poullisse (chapter 7). How, then, given this bilingual
mental architecture, can the various forms of bilingual aphasia be explained?
Paradis provides a parsimonious account of many of the phenomena in
terms of a failure of the aphasic bilingual to adapt the relative degree of
activation of his or her two language systems to the specific demands of
the communicative setting (cf. Grosjean, chapter 8). In the types of aphasia
mentioned previously, the problem appears to be that the elements in one
of the language systems of the aphasic bilingual cannot be disinhibited.
Such a suppression of one of the language systems can be temporary (suc-
cessive recovery), permanent (selective recovery), or the suppression may
alternate between the two language systems (antagonistic recovery). A form
of bilingual aphasia not mentioned yet, where the elements of the two
language systems appear to be mixed randomly, can also be readily ex-
plained in terms of a failure to control appropriately the level of activation
and deactivation/inhibition of the two language systems. In the terminology
of Grosjean, an aphasic bilingual of this type fails to suppress the activation
level of the guest language to the level appropriate for the position on the
language mode continuum that he or she is at.

Localizing both of a bilingual's languages in the language area of the left
hemisphere, as Paradis does, opposes the popular view that language rep-
resentation is less lateralized in bilinguals than in monolinguals. Paradis
suggests a solution to this potential conflict in four steps: distinguishing
between implicit and explicit aspects of language use; localizing the former
in the left and the latter in the right hemisphere; only regarding the former
as constituting the language system proper; and, finally, pointing out that
different mixes of implicit and explicit language use may be involved when
processing one language or the other. The more language processing exploits
the implicit aspects, the more the left hemisphere will be involved; con-
versely, the more the explicit aspects are employed, the more the right
hemisphere will be implicated. The latter situation may typically be the case
when bilinguals use the weaker of their two languages, in an attempt to
compensate for the relatively weak implicit competence regarding that lan-
guage. But, as Paradis argues, this is not to say that the associated language
system is localized in the right hemisphere, because explicit language use
is not part of linguistic competence proper. Paradis' analysis thus highlights the importance of specifying, in any study on language lateralization and localization in bilinguals (and monolinguals, for that matter), the aspects of language that are under study.

Taken together, the chapters included in the present volume represent a comprehensive and interrelated set of topics that we believe form the core of contemporary research on the psycholinguistics of bilingualism. The issues raised within this perspective not only increase our understanding of the nature of language and thought in bilinguals but also of the basic nature of the mental architecture that supports the ability to use more than one language. It is our hope that this book will satisfy the interest of those who seek to learn more about language processing in the bilingual, and that it will invite new research in those areas where clear answers are not yet available.

REFERENCES


