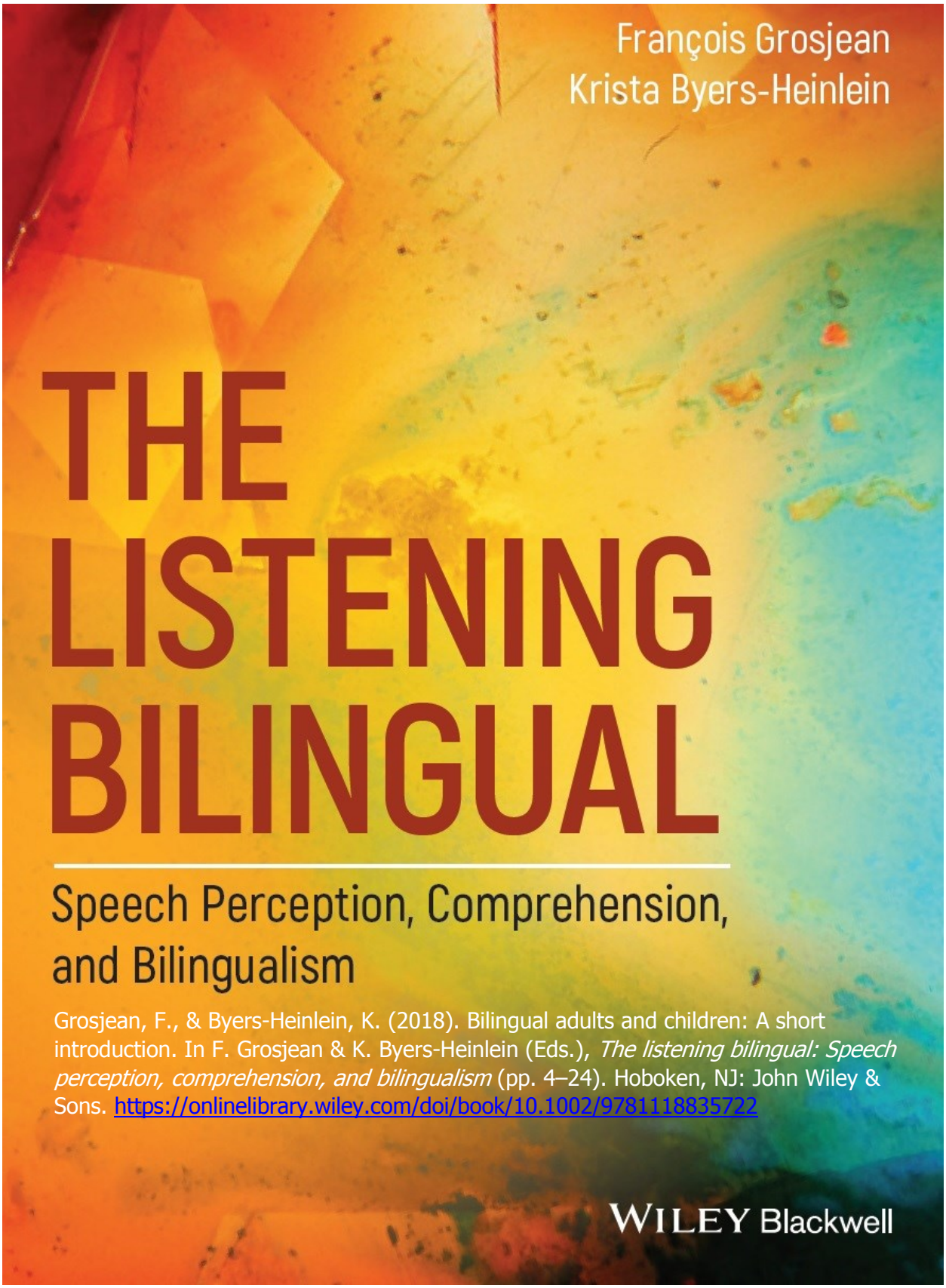
François Grosjean
Krista Byers-Heinlein
THE LISTENING BILINGUAL
Speech Perception, Comprehension, and Bilingualism
Grosjean, F., & Byers-Heinlein, K. (2018). Bilingual adults and children: A short introduction. In F. Grosjean & K. Byers-Heinlein (Eds.), *The listening bilingual: Speech perception, comprehension, and bilingualism* (pp. 4–24). Hoboken, NJ: John Wiley & Sons. https://onlinelibrary.wiley.com/doi/book/10.1002/9781118835722
WILEY Blackwell

1

Bilingual Adults and Children: A Short Introduction

François Grosjean and Krista Byers-Heinlein

Introduction

A book such as this one on a specialized topic – the perception and comprehension of speech by bilinguals – needs to begin with a brief description of bilingual adults and children.

Those who are interested in the topic may be familiar with speech perception and comprehension issues but might not know as much about bilingualism. They might also have a few misconceptions about what it means to be bilingual, both for the adult and the child. Many preconceived ideas surround bilingualism, such as that bilinguals have equal and perfect knowledge of their two or more languages, that they all acquired their languages as children, that they are competent translators, or that they do not have an accent in any of their languages. As concerns children, it was long believed that bilingualism would delay their language acquisition and create confusion, or that they would invariably mix their languages, or even that being bilingual would have negative effects on their development. The first aim of this chapter is to give a brief overview of bilingual adults and children and to lay the foundations for a better understanding of issues that relate to their perception and comprehension of speech.

A second aim is to describe what it is that bilinguals, both adults and children, bring to the studies that they take part in. When they become participants and enter the world of experimentation, they bring with them various aspects of language knowledge and processing that characterize them as "regular bilinguals." Some of these might be studied specifically in the research itself, whilst others are controlled for, and some others might be free to vary. It is important to keep them in mind when discussing studies so as to fully understand the data that are obtained.

In the first part of this chapter, we will concentrate on a few general characteristics of bilinguals, primarily adults, since children will be covered in the second part. We will first discuss how bilinguals can be described in terms of language proficiency and language use, and how these variables play a large part in the language history of each individual bilingual. This will be followed by a rapid survey of the functions of languages as well as of language dominance. Next, language mode will be evoked and aspects such as interference, transfer, code-switching, and borrowing will be discussed. Finally, biculturalism will be mentioned, as will the impact it can have on language knowledge and processing.

The Listening Bilingual: Speech Perception, Comprehension, and Bilingualism, First Edition.
François Grosjean and Krista Byers-Heinlein.

In the second part of the chapter, we will discuss special issues related to bilingual children. First, we will overview the different ages and the different ways that children become bilingual. Next, we will talk about the important role of language exposure in early bilingualism, and how researchers evaluate whether a very young child should be considered bilingual or not. We will then provide a brief overview of language acquisition in infancy and early childhood, and outline several key differences between bilingual children and adults. Finally, we will discuss how bilingual children use language in their lives and include topics such as language dominance and code-switching.

General Aspects of Bilingualism

Language Proficiency, Use, and History

A quick survey of definitions of bilingualism over the years reveals the presence of two important factors that characterize bilinguals – language proficiency and language use. In the early years of bilingualism research, language proficiency was put forward as the main defining factor, and it remains the feature most mentioned by lay people when speaking about the topic. Hence, in his now famous definition, Bloomfield (1933) stated that bilingualism is the native-like control of two languages. Realizing that bilinguals are rarely equally fluent in their languages, Haugen (1969) stayed with proficiency but offered a much less constraining definition: bilingualism begins at the point where the speaker of one language can produce complete, meaningful utterances in the other language.

Whilst some researchers continued describing bilinguals in terms of language proficiency, others were stressing another factor, language use. Hence Weinreich (1953) defined bilingualism as the practice of alternately using two languages, and Mackey (1962), a few years later, considered bilingualism as the alternate use of two or more languages by the same individual. Over the years, this definition of bilingualism has been adopted by most researchers, among them Grosjean (2013), who defines it as the use of two or more languages (or dialects) in everyday life. This definition has several advantages. The first is that it does not exclude language proficiency as such since the regular use of two or more languages requires, as a matter of course, a certain level of knowledge of each language. Other advantages are that it accounts for people who use more than two languages – there are many such people in the world today – and it encompasses dialects, a linguistic reality in many countries of the world.

Most researchers would now agree that both language proficiency and language use must be taken into account when describing bilinguals. Almost fifty years ago, Fishman and Cooper (1969) showed that they were the best predictors of a number of proficiency criterion variables. Later, Grosjean (2010) presented a grid approach to take into account the two variables. To illustrate this, Figure 1.1 (top part) presents the bilingualism profile of a person at the age of 24. Language use is shown along the vertical axis (never used to daily use) and language proficiency along the horizontal axis (low proficiency to high proficiency). As can be seen, the person's most used and most proficient language at the time was La (French). Her other language, Lb (English), was used slightly less frequently and she was slightly less proficient in it, although the level was still very high. This explains why its position is just below and to the left. She also knew

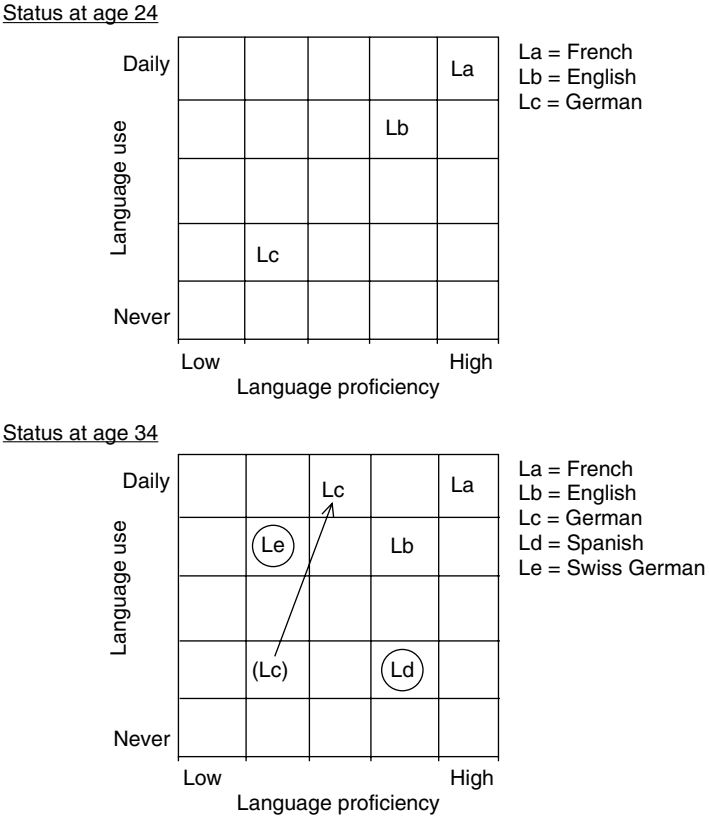

Figure 1.1 Describing a bilingual in terms of language use and language proficiency at two moments in time: at ages 24 and 34.

a third language, Lc (German), but not very well, and she used it rarely. This person was clearly bilingual in English and French, on both factors, language use and language proficiency, and like many other bilinguals, she also had some knowledge of another language but rarely used it. Note that in this type of presentation, the position of each language can be based either on self-assessment ratings, as in this case, or on the results of more objective tests.

This grid approach does not take into account certain aspects such as domains of language use, but it can show language evolution over time, as we will see below, and it can be used for each of the bilingual's language skills: speaking, listening, reading, and writing. It is often the case that the proficiency bilinguals have in the four skills is not the same for their different languages: some may have good listening abilities in a language but poor speaking abilities since they do not speak the language often; others may have oral skills in a language (speaking, listening) but may not know how to write and read it, etc.

A few years after the grid approach was proposed for the first time by Grosjean, two other researchers, Luk and Bialystok (2013), provided statistical evidence that bilingual experience does indeed involve at least two dimensions, language use (they call it

bilingual usage) and language proficiency, and that these dimensions are not mutually exclusive. These variables are the first building blocks of the description of the bilingual to which others need to be added, as we will see in this chapter.

The knowledge bilinguals have of their languages, and the use they make of them, do not remain static over the years. Such life events as moving to another region or country, meeting a partner, or losing a family member with whom one spoke a language exclusively, will change the pattern of knowledge and use of a language, and may be the reason for acquiring a new language or losing a language. To illustrate this evolution, we present in the bottom part of Figure 1.1 the languages of the same person but ten years later. If a language has changed position in the grid, an arrow indicates the cell it has moved to. As for the new languages, they are circled. Both La (French) and Lb (English) have remained in the same position, but because this person has moved to a German-speaking region, Lc (German) is now used daily and its proficiency has increased. In addition, two new languages have been acquired: Ld (Spanish), which is quite well known but is not used much, and Le (Swiss German), which is used almost daily but is not yet well known. In Grosjean (2010) five grids were needed to account for the wax and wane of the languages of a 60 year old bilingual who immigrated at various points in his life.

A bilingual's language history will reveal many features that will ultimately have an impact on language processing. We will want to know which languages were acquired, when and how, whether the cultural context was the same or different, what the pattern of proficiency and use was over the years, which language went through restructuring under the influence of another, stronger, language, and whether some languages became dormant or entered attrition. In addition, we need to know whether the bilingual is currently going through a moment of language stability or of language change where a language may suddenly acquire new importance whilst another may have less of a role to play. These transition periods, which can last several years, must be taken into account when choosing bilinguals to be participants in experiments. Language history information is usually obtained through the use of a detailed questionnaire such as The Language History Questionnaire (Li, Sepanski, and Zhao 2006). Topics that it covers, for each new language, are the age the bilingual started to learn it and the situation in which it took place, how the person acquired it (in the classroom or by interacting with other people), the age at which individual skills started being acquired in the language (speaking, reading, etc.), how many years were spent learning it, which countries the person lived in, and the length of stay there. It is by means of such tools that researchers are able to obtain values for explanatory (independent) variables such as age of acquisition of a language, length of exposure to a language, age of onset of active bilingualism, etc.

Functions of Languages

The linguistics, and especially the sociolinguistics, of bilingualism have long been interested in the functions of languages in bilinguals and, in particular, in language choice. More than half a century ago, Uriel Weinreich (1953) wrote that many bilinguals are accustomed to discuss some topics in only one of their languages and that if children study certain subjects in a unilingual school, they will have difficulty in discussing their "learned" topics in the other language. A few years later, Mackey (1962) also gave

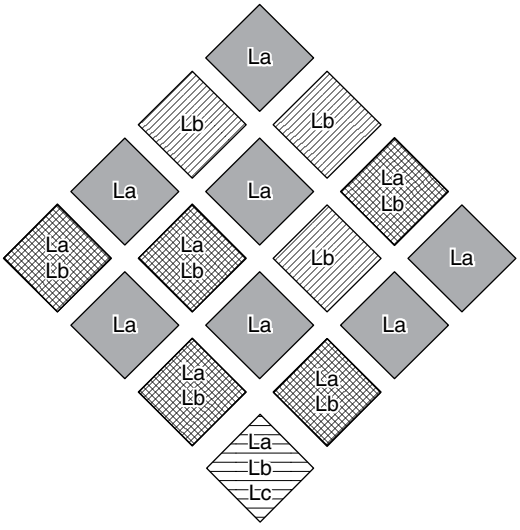

Figure 1.2 The domains covered by a bilingual's three languages.

considerable importance to function, in other words, what bilinguals use their languages for. He divided these into external functions (language use in various situations and domains) and internal functions (the non-communicative uses of language such as counting, praying, dreaming, etc.).

Based on the fact that not all facets of life in bilinguals require the same language (people would not be bilingual if that were so), nor that they always demand two languages, Grosjean (1997) proposed the Complementarity Principle, which he defined as follows: "Bilinguals usually acquire and use their languages for different purposes, in different domains of life, with different people. Different aspects of life require different languages." In order to visualize it, he used the kind of illustration that is shown in Figure 1.2. Each quadrilateral represents a domain of life such as work/studies, home, family, shopping, leisure, administrative matters, holidays, clothes, sports, transportation, health, politics, etc. As can be seen, the person depicted, a trilingual in languages a, b, and c, uses language a (La) in seven domains of life, Lb in three domains, both La and Lb in five domains, and all three languages (La, Lb, and Lc) in just one domain. Some domains, therefore, are specific to one language (ten in all) and others are shared by two or three languages (six in all). Any bilingual can be characterized in this way and will have a pattern that is specific to him or her.

The principle has a direct impact on language proficiency. If a language is spoken in a reduced number of domains and with a limited number of people, then it will not be developed as much as a language used in more domains and with more people. In the latter case, there will be an increase in specific vocabularies, stylistic varieties, discursive and pragmatic rules, etc. It is precisely because the need and use of the languages are usually quite different that bilinguals do not develop equal and total proficiency in all their languages. This is also true for the different language skills, such as reading and writing.

Grosjean (2016) reviews studies that have started to obtain data on language use in different domains of life by individual bilinguals. He also describes psycholinguistic studies in the areas of perception, production, and memory in which the impact of the principle is shown; see, for example, Carroll and Luna (2011). As concerns language

acquisition, Bialystok et al. (2010) tested the English receptive vocabulary of a very large number of monolingual and bilingual children whose school language was English. They found that monolingual children outperformed bilingual children when tested in just one language. To try to understand this finding, they examined the results by domain: the school domain and the home domain. The difference they found between monolinguals and bilinguals was maintained in the home domain since bilingual children used their other language at home and hence did not know English home words as well. However, in the school domain, a domain where English was used by both groups, the monolingual and bilingual children had the same amount of receptive vocabulary. In sum, different aspects of life, be it in children or adults, often require different languages, whereas other domains are covered by both languages.

Language Dominance

One of the more difficult concepts in the field of bilingualism is language dominance: Is it based on proficiency? On use? On both proficiency and use? On the ability to read and write a language? On when the languages were acquired? Many specialists such as Flege, MacKay, and Piske (2002) put the emphasis on proficiency – objective proficiency (as it is evaluated by researchers) and subjective proficiency (as it is reported by the bilinguals themselves). However, other specialists do not limit dominance to just proficiency. For example, in a book dedicated to the issue, Silva-Corvalán and Treffers-Daller (2016) define a dominant language as that in which a bilingual has attained an overall higher level of proficiency at a given age and/or the language that the person uses more frequently, across a wider range of domains.

Researchers have long tried to measure dominance. Among the more objective assessment tools used, one finds language evaluation measures by outside judges (including pronunciation evaluation), as well as different behavioral tasks. From the various measures obtained, specialists give their subjects a dominance rating: the person is dominant in language A or dominant in language B or balanced in both languages (if such a person exists). However, these various approaches have been criticized for reducing the complexity of the bilingual's language behavior to a number of simple laboratory tasks often given in just one language. In addition, the cut-off point in the results of a particular task to separate dominant from balanced bilinguals is arbitrary. It is also the case that many people use more than two languages in their everyday life, which complexifies things even more.

On the self-assessment side, bilinguals are given language background questionnaires that include, among other things, self-assessment scales for language proficiency and language use for their two or more languages. For example, in the Bilingual Dominance Scale proposed by Dunn and Fox Tree (2009), a number of questions pertain to the onset of bilingualism (when the languages were learned and when the respondent started feeling comfortable speaking each language), some deal with language use, and others concern accent, proficiency, the country/region the bilingual lives in, etc.

If we only concentrate on language use, questionnaires such as this one may produce a global measure of dominance and may confirm, for example, that the bilingual depicted in Figure 1.2 is globally dominant in La, which covers more domains (13 domains counting shared domains) than Lb (9 domains counting shared domains). However, the problem with global dominance is that it does not take into account that

some domains are specific to a language. Thus, even though the bilingual in the figure is globally dominant in La, we see that there are three domains in which she uses Lb exclusively. With adequate assessment tools, it would probably be fairly easy to show that this bilingual is dominant in Lb in these domains.

One final point needs to be made about dominance. Grosjean (2010) describes a person whose dominance has changed four times over a stretch of some fifty years, with two periods, both some ten years long, where the second language was the person's dominant language. One should be careful, therefore, not to assume that people's first language or "mother tongue" is automatically their dominant language. People's personal language history may show quite different bilingual configurations at different moments in time.

Language Mode

When interacting with others, bilinguals have to ask themselves two questions: first, "Which language should be used?" and, second, "Should the other language be brought in?" The answer to the first question leads to language choice, that is, choosing a base language for the exchange. It is governed by a number of factors: the interlocutor(s) involved, the situation, the content of the discourse and the function of the interaction. Language choice is a well-learned behavior (a bilingual rarely asks the conscious question, "Which language should I be using with this person?") but it is also a very complex phenomenon that only becomes apparent when it breaks down. Usually, bilinguals go through their daily interactions with others quite unaware of the many psychological and sociolinguistic factors that interact to help choose one language over another. We should note that the base language can change several times during a short span of time if it needs to (see Grosjean 2010, 2013).

As concerns the second question ("Should the other language be brought in?"), if the answer is "no", then the other language remains inactive. This is called the monolingual language mode and it occurs when a bilingual is speaking to a monolingual adult or child, listening to only one language being used (e.g., on radio), reading in a particular language, etc. If, on the other hand, the answer is "yes", as when the bilingual is speaking to another bilingual who shares his/her languages and who accepts to use both, often intermingling them, then the other language is activated but less so than the base language. The person is then in a bilingual mode. Other examples where the bilingual mode is required are listening to two bilinguals who are mixing languages, interpreting from one language to another, doing an experimental study that requires the two languages, either overtly or covertly, and so on. In between these two endpoints of the continuum, bilinguals can find themselves in various intermediary modes, depending on the situation, the topic, the interlocutors, etc.

Language mode is the state of activation of the bilingual's languages and language processing mechanisms at a given point in time (Grosjean 2008). Bilinguals differ as to how much they move along the continuum, some remaining in a monolingual mode for long periods of time or in a bilingual mode, whilst others move back and forth between the endpoints. This movement can take place at any time and in any place. Since language mode can change frequently, it means that the bilingual's processing system is dynamic and can operate in different activation states. Whether processing is selective (only one language is used) or non-selective (several languages are involved) will depend on the activation levels of the languages, which in turn depend on a number of internal and external factors.

Interacting in One or Several Languages

When in a monolingual mode, bilinguals adopt the language of the monolingual interlocutor(s) and deactivate their other language(s) as completely as possible. Those who manage to do so totally and, in addition, who speak the other language fluently and have no foreign accent in it, will often "pass" as monolinguals. Although such cases are relatively rare, it is precisely these that have led people to think that bilinguals are (or should be) two monolinguals in one person. In fact, deactivation is rarely total as is clearly seen in the interferences bilinguals produce. An interference is a deviation from the language being spoken (or written) due to the influence of the other language(s). Interferences can occur at all levels of language (phonological, lexical, syntactic, semantic, pragmatic), in production and perception, in all modalities (spoken, written, or sign), and in all language modes. Examples of interferences produced by a French person speaking English are as follows. At the phonetic level, pronouncing *Sank evven for dees* instead of *Thank heaven for this*; at the lexical level, using *corns* (from French *cornes*) instead of *horns* in *Look at the corns on that animal!*; at the syntactic level, saying *I saw this on the page five* (instead of *on page five*); and in writing, misspelling *adress* or *appartment* (based on the French *adresse* and *appartement*).

Interferences must be distinguished from intralanguage deviations such as overgeneralizations (e.g., taking irregular verbs and treating them as if they were regular), simplifications (dropping pluralization and tense markers, omitting function words, simplifying the syntax, etc.), as well as hypercorrections and the avoidance of certain words and expressions. These are often due to a low or medium level of proficiency in a language and not to the direct influence of the other language, as in the case of interferences. Both types of deviations, although sometimes quite apparent (such as a foreign accent), usually do not interfere with communication in the long run. This is because bilinguals develop their languages to the level of proficiency required by the environment. Deviations in bilingual speech are thus of the same nature as slips of the tongue and hesitation phenomena. They are present but do not usually affect communication.

Interferences, also termed "transfers" by many, are of two types. There are static interferences that reflect permanent traces of one language on the other (a permanent accent, the meaning extensions of particular words, specific syntactic structures, etc.) and are linked to the person's competence in the language in question. It has been proposed to reserve the name "transfer" for these static interferences (Grosjean 2012). The other type are dynamic interferences, which are the ephemeral intrusions of the other language (as in the case of the accidental slip on the stress pattern of a word due to the stress rules of the other language, the momentary use of a syntactic structure taken from the language not being spoken, etc.). Dynamic interferences are linked to processing and have to be accounted for by encoding mechanisms. Bilinguals often report making interferences when they are tired, stressed, or emotional since what is normally under control can break down under these conditions.

In a bilingual mode, bilinguals interact with one another. As we saw, they first adopt a language to use together, what is known as the "base language" (also the "host" or "matrix" language). Once it has been chosen, bilinguals can bring in the other language (the "guest" or "embedded" language) in various ways. One of these is to code-switch, that is, to shift completely to the other language for a word, a phrase, or a sentence. For example, *Va chercher Marc and bribe him avec un chocolat chaud with cream on top*

(Go get Marc and bribe him with a hot chocolate with cream on top). Code-switching has long been stigmatized and has been given a number of pejorative names such as Franglais (the switching between French and English) or Tex-Mex (the switching between English and Spanish in the southwestern part of the United States). The consequence of this has been that some bilinguals never switch while others restrict it to situations in which they will not be stigmatized for doing so.

Although looked down upon for a long time, code-switching is slowly being recognized as a normal mode of communication to convey linguistic and social information among bilinguals and is receiving considerable attention from researchers (e.g., Gardner-Chloros 2009). For example, sociolinguists concentrate on when and why switching takes place in the social context, linguists seek to study the types of code-switches that occur (single words, phrases, clauses, sentences, etc.), as well as the linguistic constraints that govern their appearance, and psycholinguists examine how they are processed.

The other way bilinguals can bring in the other, less activated, language is to borrow a word or short expression from that language and to adapt it morphologically (and often phonologically) into the base language. Thus, unlike code-switching, which is the juxtaposition of two languages, borrowing is the integration of one language into another. Most often both the form and the content of a word are borrowed (to produce what has been called a loanword or more simply a borrowing), as in the following example taken from a French–English bilingual: "*Ca m'étonnerait qu'on ait code-switché autant que ça*" (I can't believe we code-switched as often as that). Here, the English words "code-switch" has been brought in and integrated into the French sentence. A second type of borrowing, called a loanshift, consists in either taking a word in the base language and extending its meaning to correspond to that of a word in the other language or rearranging words in the base language along a pattern provided by the other language and thus creating a new meaning. An example of the first kind would be the use of "humoroso" by Portuguese–Americans to mean "humorous" when the original meaning is "capricious". An example of the second kind is the use of idiomatic expressions that are translated literally from the other language, such as "I put myself to think about it" said by a Spanish–English bilingual, based on "Me puse a pensarlo". It is important to distinguish idiosyncratic loans (also called "speech borrowings" or "nonce borrowings") from words that have become part of a language community's vocabulary and that monolinguals also use (called "language borrowings" or "established loans"). Research examines, among other things, the differences and similarities that exist between code-switches and borrowings (and, within the latter, between idiosyncratic borrowings and established borrowings), as well as the impact of the two on language itself, such as first- and second-language restructuring, as well as upon language processing.

Biculturalism

Bilingualism and biculturalism are not automatically coextensive. You can find bilinguals who are not bicultural (e.g., those bilinguals who have lived in just one culture, such as many Dutch people), biculturals who are not bilingual (e.g., British people who have migrated to the United States), as well as people who are both bicultural and bilingual. Biculturals can be characterized in the following way (Grosjean, 2008; Nguyen and Benet-Martinez 2007): they take part, to varying degrees, in the life of two or more

cultures; they adapt, in part at least, their attitudes, behaviors, values, languages, etc., to these cultures; and they combine and blend aspects of the cultures involved. Some aspects are adaptable and controllable, allowing the bicultural to adapt to the context and the situation, whilst others are more static; they are blends of the cultures and cannot be adapted as easily.

Research on speech and language processing is starting to manipulate or control for the biculturalism of participants in observational and experimental studies since many aspects of cognition and language are influenced by biculturalism. One example concerns the bilingual lexicon and the impact biculturalism may have on its organization. A bicultural bilingual will often have different concepts for words that appear to be, at first sight, translation equivalents, for example, "bread" and "pain" in French. For the person who has lived in both the United States and France, "bread" refers to a large loaf baked in a bread pan whereas "pain" refers to the baguette type of bread. The same case can be made for English "coffee" and French "café". The influence of biculturalism on the nature of the bilingual's lexicon was acknowledged early on by Weinreich (1953) with the difference he proposed between coordinative and compound bilingualism. In the coordinative type, the meaning of words in the two languages are kept separate (each word has its own meaning) whereas in the compound type, the words share a common meaning. Of course, things are not as clear-cut and it is now accepted that some aspects of life in different cultures will lead to words with meanings that refer to different cultural underpinnings (as in the examples above), other aspects to words sharing meaning components, and still others to words with totally overlapping meanings. As Pavlenko (2009) states, translation equivalents are not always conceptual equivalents – some words may be in a relationship of partial equivalence and there are words with no conceptual equivalents in the other language.

Thus, biculturalism joins other better-known features of bilingualism such as language proficiency, use, history, dominance, as well as language activation and mode, not to mention general factors such as age, which may explain, in part at least, how the bilingual's languages are processed and stored.

Bilingual Children

How Do Children Become Bilingual?

Children have probably been growing up bilingual since the earliest days of contact between different languages. Yet, one of the first documented studies of childhood bilingualism is only 100 years old. Jules Ronjat was a French linguist married to a German woman. Under the recommendation from fellow linguist Maurice Grammont, the couple decided to raise their son Louis bilingual in French and German using the one person–one language approach. Louis' father spoke to him only in French, while his mother spoke to him only in German. By all accounts this experiment in raising a bilingual child was a success and Louis grew up speaking fluent French and German.

Grammont advised a one person–one language strategy because he believed that it would lead to less "grave confusion and exhausting intellectual effort" (Ronjat 1913, 3). Even in current times, there remains a strong belief that growing up with two languages could be confusing to children. However, there is no scientific evidence to suggest that

young bilinguals are confused or that a one person–one language approach is needed to prevent confusion. Even newborn infants exposed to two languages prenatally can tell their languages apart based on simple rhythmic differences (Byers-Heinlein, Burns, and Werker 2010). While some parents of bilingual children follow a one person–one language approach, there are a myriad of ways in which children successfully grow up bilingual. There is no need to separate a bilingual child's languages by person, place, or time, because children are highly flexible language learners.

Children grow up bilingual under many different circumstances. They might be born into bilingual families, where the parents speak different languages, and one or both parents is themselves bilingual. Some parents choose caregiving arrangements or educational opportunities that expose their children to a second language, such as hiring a nanny who speaks a particular language or enrolling their children in language immersion programs at school. Many children grow up in multilingual communities, where nearly everybody speaks several languages. Immigration is another common reason for childhood bilingualism and children from immigrant families often learn one language at home and another language outside of the home. Finally, some children acquire three or more languages and others, rather than learning distinct languages, are exposed to two varieties of the same language.

Even with ongoing exposure to two or more languages, not all bilingual children will grow up to be active bilinguals. Annick De Houwer (2007) conducted a study with nearly 2000 families of bilingual children who were between the ages of 6 and 10 years old. The families lived in Flanders, an officially Dutch-speaking region of Belgium. All children went to school using Dutch and were exposed to a language other than Dutch at home from one or more family members. De Houwer wanted to understand which of these children had continued to use both Dutch as well as their home language as they grew up. She found that while all the children spoke Dutch, only 75% of the children actively spoke their other language. The children who had at least one parent (preferably two) who spoke only the second language at home were those most likely to retain that language, while children with more family members who spoke Dutch at home were least likely to retain their other language. Despite all children receiving regular exposure to both languages, there were large individual differences as to whether both languages continued to be actively used.

A language's status as a minority or majority language can have a big impact on whether bilingual children will grow up to use this language. A majority language is a language used by most of the population and is often recognized by the government as an official language. In contrast, a minority language is only spoken by a small percentage of a population and may or may not be officially recognized. It is sometimes called a heritage language, particularly if it is learned primarily at home as a first language. Children almost always acquire a community's majority language (Dutch in De Houwer's study), but successfully acquiring a minority language is more precarious, especially as majority language peers grow to have a larger influence than parents.

Language acquisition in childhood often follows a use-it or lose-it principle. Languages that do not continue to be heard or spoken are lost through a process called language attrition, which can happen to either the first or to later-learned languages. However, there is some exciting new evidence that, although not readily accessible, traces of these lost languages remain in the brain. A group of researchers studied 9–17 year old children in Quebec who had been adopted from China around age 1 year (Pierce et al.

2014). The children had spoken only French since adoption. Researchers had these children try to discriminate between different Chinese tones. The adoptees showed a brain response similar to Chinese/French bilinguals and different from French monolinguals with no exposure to Chinese. Despite having no overt recollection of Chinese and no exposure to the language for at least 12 years, their brains still showed a special ability to process the language. Despite their brain's residual sensitivity to the Chinese sounds, these children's inability to actually speak Chinese shows how an early-learned language can quickly become inaccessible.

Quantity and Quality of Language Exposure

While all children are exposed to at least one native language from birth, bilingual children vary widely as to the age at which they begin acquiring additional languages. Some children, called simultaneous bilinguals or crib bilinguals, grow up from birth with two native languages. Other children, known as sequential bilinguals or childhood second language learners, learn a first language from birth and a second language sometime later in childhood. What is the dividing line between simultaneous and sequential bilingualism? Is a bilingual child who begins hearing both languages the day of birth different from one who begins hearing a second language at age 2 months? What about 6 months? Three years? This question has no simple answer. We should note that researchers who study very young children often use the term "simultaneous bilinguals" specifically for those who have encountered both languages regularly from the first few days of life.

In our discussion of bilingual adults, we identified language proficiency and language use as two important factors for describing their bilingualism. However, these same factors do not always make sense in the context of younger bilinguals. Infants have very limited language proficiency and do not "use" their languages in the same way as adults do. Instead, young bilinguals are usually characterized according to their exposure to different languages. Language exposure can be measured via parental report questionnaires, such as that developed by Bosch and Sebastián-Gallés (2001). An interviewer walks a parent through a typical day in a child's life, estimating the number of hours the child has heard each language and from which caregivers. Separate estimates are made for weekdays and weekends, and for different months of the child's life as caregiving arrangements change. Based on this interview, the researcher calculates an estimate of the percentage of time that the child has heard each language both currently and across his or her lifetime, and whether the child is best characterized as a simultaneous or a sequential bilingual.

In a research context, estimates of language exposure are often used to determine whether or not a child should be considered bilingual. As Byers-Heinlein (2015) has documented, studies vary widely as to the minimum exposure for which a child is considered bilingual, but most studies require a minimum of 25–30% exposure to each language. It is not well-established what minimum amount of exposure is necessary for a child to learn two languages and as children grow older, other factors including language proficiency and use come to outweigh the simple effects of exposure.

Despite its usefulness in studies of young bilinguals, percentage exposure to each language is likely to be an overly simplistic characterization of early language environments. For example, a child with talkative parents and teachers is likely to hear a lot

more words and sentences in a given language than a child who spends time with less talkative interlocutors. Children who hear a greater quality of language show faster vocabulary growth and language processing (Weisleder and Fernald 2013). Finally, even though bilinguals learn at the same rate as monolinguals, it is important to remember that children's time and thus their language knowledge is divided between their languages. As pioneering researcher Barbara Pearson has clearly illustrated in her studies of early vocabulary size (see, for example, Pearson, Fernández, and Oller 1993), both languages need to be taken into account when comparing the development of young monolinguals and bilinguals.

To some degree, bilingual children might be able to transfer knowledge across their languages to overcome the reduced input in each language. For example, one study found that bilingual children who knew more words in one of their languages also knew more words in their other language (Kan and Kohnert 2005). On the other hand, children might also experience language interference. For example, in a recent study investigating whether a bilingual 16 month old could learn rhyming words, children learning dissimilar languages performed worse than children learning more similar languages (Havy, Bouchon, and Nazzi 2015). However, children's real-world vocabulary sizes did not differ depending on how similar their languages were, suggesting that language similarity might not affect the overall rate of language acquisition. Indeed, other research suggests that the development of bilingual children's two languages proceeds relatively independently. For example, in a study of Spanish-English learning toddlers, vocabulary size in one language predicted grammatical development in that same language, but not in the other language (Conboy and Thal 2006).

The quality of language input also matters in early bilingual language acquisition. While to some degree adults can learn language from books, movies, and recordings, young children learn language best from social interaction with real people. Kuhl, Tsao, and Liu (2003) clearly demonstrated the importance of social interaction in a study that exposed English-learning infants to Mandarin. Over the course of several sessions, one group of infants interacted with a live Mandarin speaker, another group saw a video recording of the speaker, and a third group heard an audio-only recording of the speaker. At the end of the study, the researchers tested what the infants learned about a speech sound contrast that is meaningful in Mandarin but not in English. Only the group who had been exposed to the live speaker showed evidence of learning, revealing the key role of social interaction.

The number and type of speakers that bilingual children interact with can also influence their language acquisition. For example, bilingual children show greater language knowledge when more of their input comes from native speakers of that language, rather than from non-native speakers (Place and Hoff 2010). Further, hearing a particular language from a greater number of different speakers also boosts early second-language learning (Gollan, Starr, and Ferreira 2014).

As children get older, it becomes possible to measure their proficiency in each language. Vocabulary size is a particularly common measure of proficiency. For infants and children aged up to 30 months, parents can check off the words their child understands or can say from a language-specific list of vocabulary words they might know. Lists of words in each of their languages are used so that total vocabulary size across the two languages can be calculated. Studies of older children can use adapted versions of many of the tests employed with bilingual adults, such as pointing to the referent of a word

amongst a set of pictures, or responding to questions verbally or through a button press. Tasks are often shortened to accommodate children's more limited attention spans and are made more fun with puppets or stickers.

The Typical Path of Language Development

Regardless of whether they are acquiring one language, two languages, or more, children around the world show remarkable similarity in the initial sequence of language acquisition. Speech perception and comprehension, the focus of this book, develop in tandem with speech production. Simultaneous bilingual children develop their two languages in parallel, and achieve early language milestones on a similar schedule to monolingual children. Sequential bilingual children begin life as monolinguals and later add knowledge of a second language.

Speech production milestones are some of the easiest language-acquisition behaviors to observe. Children's first productions are cries, coos, burps, and squeaks. Somewhere between age 6 and 10 months, infants start babbling, by producing real syllables that at first repeat (*bababa*) and later become more varied (*bamanamapa*). These early productions gradually take on the sounds, rhythm, and intonation patterns of infants' native language. Much less research has been done on babbling in bilingual infants, for example, whether young bilinguals show distinct patterns of babbling that correspond to their two native languages.

Children's first words represent their first production of meaningful speech. Petitto et al. (2001) studied two sets of bilingual children: one group was acquiring two spoken languages (French and English) and a second group was acquiring a signed (Langues des Signes Québécoise) and a spoken language (French). All children had normal hearing. Researchers found that both groups of children achieved early milestones in each language at the same time, and on a similar timeframe to monolinguals. For example, children produced their first words between 10 and 14 months, and between 17 and 21 months they could produce as many as 50 words. Between ages 17 and 20 months, children started producing two-word combinations, showing the first signs of grammatical development. While early word combinations are not usually full grammatical sentences, they generally combine words in the same order as adults produce them (e.g., "want apple" not "apple want"). Bilingual children's speech production milestones were on-target with those of monolinguals. This research highlights children's ability to flexibly acquire one or more languages, whether that language is spoken or signed.

The milestones of language production are preceded by achievements in language perception and comprehension (see Figure 1.3). These will be reviewed in-depth in the coming chapters. As an overview, children spend much of the first year of life listening to and looking at speakers of their native languages. This allows them to tune into the properties of these languages, such as refining their phonetic perception to focus on those speech sound contrasts that are meaningful. At the same time, they begin parsing or segmenting the speech stream into its constituent words and recognizing those word forms that occur frequently in their input. As early as 6 months, long before they say any words, infants begin associating these segmented patterns to meaning, showing the beginnings of word learning and comprehension. Over time, they begin to show comprehension of the grammar of their native language or languages, for example, understanding the important difference between "The dog is chasing the cat" and "The cat is

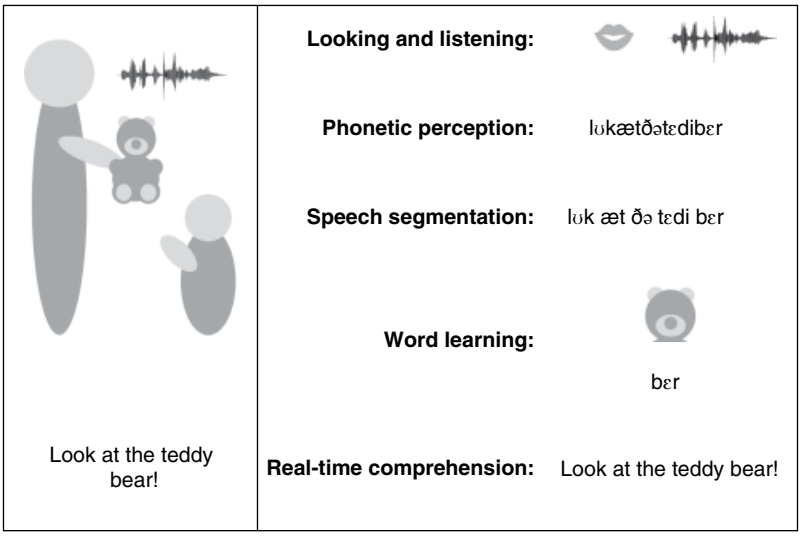

Figure 1.3 Developing skills in perception and comprehension in the first few years of life. Adapted from Figure 23.1 in Byers-Heinlein, Krista, and Casey Lew-Williams. 2017. "Language comprehension in monolingual and bilingual children". In *The Handbook of Psycholinguistics*, edited by Eva M. Fernandez and Helen Smith Cairns, 516–535. Hoboken, NJ: John Wiley & Sons, Inc.

chasing the dog". Together, these abilities contribute to real-time comprehension of running speech. Rather than developing in isolation, children can bootstrap across one area of acquisition to another one. For example, upon hearing a sentence with a nonsense word "blicking", for example, "She's blicking the balloon", children can use their burgeoning grammatical knowledge to guess that "blicking" is likely to be a verb because of its location in the sentence and also its ending in -ing. Many of these same capacities important for acquiring a first language or languages are also used by sequential bilingual children to acquire their second language, albeit at a later point in development.

Finally, children also come to master the pragmatics of their two languages, for example, how to interpret a speaker's tone of voice, take turns within a conversation, or repair a conversation when communication breaks down. Bilingual children are particularly skilled in this domain. For example, one study showed that bilingual children were better than monolinguals at using tone of voice to judge a speaker's emotions (Yow and Markman 2011).

Similarities and Differences Between Bilingual Children and Adults

For the most part, this volume considers child and adult bilingualism in separate chapters. This is because the process and outcomes of language acquisition and processing unfold somewhat differently across these two groups. One important reason is that there is considerable evidence for a sensitive period for language acquisition: on the whole, languages can be more easily and completely mastered when exposure begins early in life (see Figure 1.4). One implication is that some aspects of childhood bilingualism might be qualitatively different than bilingualism whose onset is in adulthood. On the other hand, despite the sensitive period for language, individuals can and do become bilingual at any age, from infancy to adulthood.

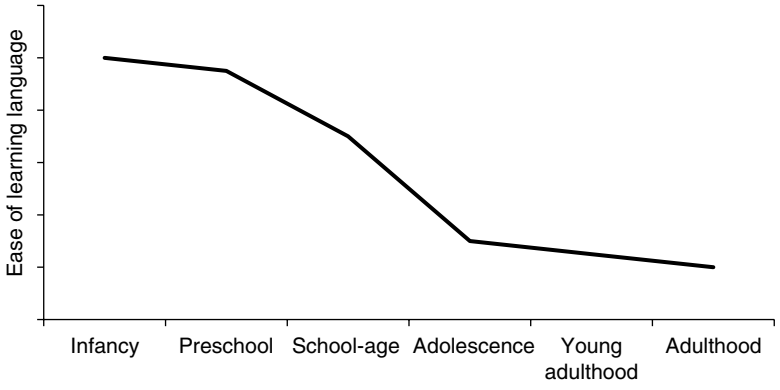

Figure 1.4 An illustration of the sensitive period for language acquisition. A new language is often more easily acquired earlier in life than later in life.

Even within early childhood, there can be different developmental patterns depending on the age at which exposure to a second language first begins. Sebastián-Gallés, Echeverría, and Bosch (2005) looked at how highly proficient Spanish–Catalan bilinguals perceived a sound difference that is meaningful in Catalan, but not in Spanish. Recall that infants refine their phonetic perception long before they perfect their language's grammar. Bilinguals who had learned both languages from birth were more sensitive to the sound difference than those who had learned Catalan sometime after Spanish, but before age 4. Clearly, even when both languages are learned during the preschool years and subsequently mastered, the timing of language exposure matters to how language will ultimately be processed.

Unlike adults, bilingual children are still in the process of acquiring and refining their first language. Different components of language are acquired at different ages. Rather than a single sensitive period for language, Janet F. Werker and Richard Tees (2005) have suggested there may instead be a set of cascading sensitive periods for different components of language. For example, children who begin hearing a new language at age 1 will have already tuned into the sound system of their native language, but may have only limited knowledge of their native language's vocabulary and grammar. Thus, the sound system of the new language must be learned on top of existing knowledge (when the sensitive period for phonetic development is past its peak), while grammatical knowledge of the two languages can be built in tandem.

Language acquisition depends not only on linguistic abilities but also on other cognitive capacities such as memorization and categorization, as well as the motor skills necessary to control the tongue, jaw, and lips. On the one hand, this puts children at a language-learning disadvantage to adults, as they have less developed extralinguistic skills. For example, because of more advanced memories, adults can memorize new words faster than children. However, children's limitations can sometimes be to their advantage. Elissa Newport (1990) has put forward the Less is More Hypothesis. She proposes that, because of their cognitive limitations, young children have to analyze language in very small chunks, much smaller than the chunks that adults can analyze. As such, they are better at ignoring inconsistencies in the input, and finding regular patterns and rules.

Another important foundation for language learning is children's developing social skills. For example, when trying to learn new words, children must be able to use information such as an adult pointing and eye gaze to figure out what the adult might be talking about. One important social capacity is called theory of mind, the understanding that people are intentional agents with their own beliefs. There is some evidence that growing up bilingual might actually enhance children's theory of mind ability (Goetz 2003; Kovács 2009). This makes sense because bilinguals must constantly evaluate which language different people know and try to use the appropriate language or languages.

Children's language-learning experiences can also be systematically different from those of adults. Young children are spoken to in a special speech register, known as child-directed or infant-directed speech (IDS). IDS is used by adults in interactions with children nearly universally across languages and cultures worldwide. It is characterized by a higher pitch, more exaggerated intonation contours, longer pauses, simplified sentences, and repetition. Many studies have shown that IDS is beneficial to infant language development. Infants pay more attention to IDS than to adult-directed speech and they are better at learning words that are spoken in IDS (Graf-Estes and Hurley 2013). Interestingly, some research has suggested that IDS might also be helpful to adults learning words in a new language (Ma et al. 2011). This said, interlocutors seldom use IDS with adult language learners.

Language in Children's Lives

Different languages come to assume different roles in bilingual children's lives. A home language is the language of one's family and culture. A language spoken with peers is the language of play and socialization. A school language is the language of academic learning. Sometimes the same language is used in two different domains and sometimes two languages are used in the same domain (see the description of the Complementarity Principle in the first part of this chapter). Because of these many roles that languages play, children often develop different language skills in each of their languages, and this can have important long-term consequences. For example, children of immigrant parents can vary widely in how proficient they are in their heritage language. In a study of Korean–Americans, those who had a weaker knowledge of Korean felt less connected to their ethnicity and culture than those who had stronger knowledge of Korean (Cho 2000). However, participants also reported that their knowledge of Korean had little impact on their education, as most attended school in English.

Just as in adulthood, children's stronger language is often called their dominant language. Determining a child's dominant language can be particularly important when trying to assess their language abilities, an issue that we will explore more fully in Chapter 11. Several different approaches can be used to determine bilingual children's dominant language. It can be operationalized as the one children hear more often, the one in which they know more words, or the one in which they can produce the longest utterances. For some children, these different ways of defining dominance will all point to the same dominant language, but for other children they will not. One important reason is that each way of measuring language dominance only looks at a small slice of children's language experience and capacities. Rather than having a single, globally dominant language, many children have uneven language profiles. A second important

point is that children's language experiences are highly dynamic: children may change caregiving arrangements, make new friends, move to a different country, or begin attending a school where a new language is spoken. This means that a child's dominant language can change several times over the course of development.

Children's language dominance has an important influence on their language use. Very young bilinguals tend to favor their dominant language across a range of language situations, although they do have some ability to accommodate to the language of their interlocutor (Genesee, Boivin, and Nicoladis 1996). As children get older, they often gravitate towards the language used by the wider community and by their peers, rather than their home language. Parents of bilingual children must often make a special effort to ensure that a home language is maintained.

One unique aspect of bilinguals' early speech is that they are able to choose to speak one or both of their languages. Like bilingual adults, bilingual children often mix words from their two languages in the same sentence or conversation. Depending on exactly how the mixing occurs, this behavior can be called borrowing, language-mixing, or code-switching. Some parents worry that this is a sign of language confusion, but most research suggests that this is not the case. Language mixing in children is not haphazard or random. Instead, children's mixing follows principled rules, in the same way that adults' mixing does. Children also appear to switch between their languages in strategic ways. For example, if they are not yet able to name an object in one language, they might substitute the word in their other language. In some studies, less balanced bilinguals have shown more language mixing than more balanced bilinguals (Ribot and Hoff 2014). As children get older, they achieve greater mastery of both languages. At this point, they have the same range of choice as bilingual adults do in their interactions, and may function in either a monolingual or a bilingual language mode.

Summary

In this chapter, we have attempted to describe bilingual adults and children and to lay the foundations for a better understanding of issues that relate to their perception and comprehension of speech. We have also described various aspects of language knowledge and processing that they bring to the studies they take part in. The topics discussed include language proficiency and use, language history and exposure, language mode, language dominance, biculturalism, how and when children acquire their languages and become bilingual, as well as the roles languages play in their lives. These various aspects of bilingualism that have been discussed will reappear in chapters throughout this book, be they on the perception and comprehension of speech by adults or by children.

References

Bialystok, Ellen, GigiLuk, Kathleen F. Peets, and Sujin Yang. 2010. "Receptive vocabulary differences in monolingual and bilingual children." *Bilingualism: Language and Cognition*, 13 (4): 525–531.

Bloomfield, Leonard. 1933. *Language*. New York: Holt.

Bosch, Laura, and Núria Sebastián-Gallés. 2001 "Evidence of early language discrimination abilities in infants from bilingual environments." *Infancy*, 2 (1): 29–49.
Byers-Heinlein, Krista. 2015. "Methods for studying infant bilingualism." In *The Cambridge Handbook of Bilingual Processing*, edited by John W. Schwieter, 133–154. Cambridge: Cambridge University Press.
Byers-Heinlein, Krista, Tracey C. Burns, and Janet F. Werker. 2010. "The roots of bilingualism in newborns." *Psychological Science*, 21 (3): 343–348.
Carroll, Ryall, and David Luna. 2011. "The other meaning of fluency: Content accessibility and language in advertising to bilinguals." *Journal of Advertising*, 40 (3): 73–84.
Cho, Grace. 2000. "The role of heritage language in social interactions and relationships: Reflections from a language minority group." *Bilingual Research Journal*, 24 (4): 369–384.
Conboy, Barbara T., and Donna J. Thal. 2006. "Ties between the lexicon and grammar: Cross-sectional and longitudinal studies of bilingual toddlers." *Child Development*, 77 (3): 712–735.
De Houwer, Annick. 2007. "Parental language input patterns and children's bilingual use." *Applied Psycholinguistics*, 28 (3): 411–424.
Dunn, Alexandra L., and Jean E. Fox Tree. 2009. "A quick, gradient Bilingual Dominance Scale." *Bilingualism: Language and Cognition*, 12 (3): 273–289.
Fishman, Joshua, and Robert Cooper. 1969. "Alternative measures of bilingualism." *Journal of Verbal Learning and Verbal Behavior*, 8 (2): 276–282.
Flege, James E., Ian R. A. MacKay, and Thorten Piske. 2002. "Assessing bilingual dominance." *Applied Psycholinguistics*, 23: 567–598.
Gardner-Chloros, Penelope. 2009. *Code-Switching*. Cambridge: Cambridge University Press.
Genesee, Fred, Isabelle Boivin, and Elena Nicoladis. 1996. "Talking with strangers: A study of bilingual children's communicative competence." *Applied Psycholinguistics*, 17: 427–442.
Goetz, Peggy J. 2003. "The effects of bilingualism on theory of mind development." *Bilingualism: Language and Cognition*, 6 (1): 1–15.
Gollan, Tamar H., Jennie Starr, and Victor S. Ferreira. 2014. "More than use it or lose it: The number-of-speakers effect on heritage language proficiency." *Psychonomic Bulletin and Review*, 22 (1): 147–155.
Graf-Estes, Katharine, and Karinna Hurley. 2013. "Infant-directed prosody helps infants map sounds to meanings." *Infancy*, 18 (5): 797–824.
Grosjean, François. 1997. "The bilingual individual." *Interpreting*, 2 (1/2): 163–187.
Grosjean, François. 2008. *Studying Bilinguals*. Oxford: Oxford University Press.
Grosjean, François. 2010. *Bilingual: Life and Reality*. Cambridge, MA: Harvard University Press.
Grosjean, François. 2012. "An attempt to isolate, and then differentiate, transfer and interference." *International Journal of Bilingualism*, 16 (1): 11–21.
Grosjean, François. 2013. "Bilingualism: A short introduction." In *The Psycholinguistics of Bilingualism*, by François Grosjean, and Ping Li, 5–25. Malden, MA: Wiley-Blackwell.
Grosjean, François. 2016. "The Complementarity Principle and its impact on processing, acquisition, and dominance." In *Language Dominance in Bilinguals: Issues of Measurement and perationalization*, edited by Carmen Silva-Corvalán and Jeanine Treffers-Daller, 66–84. Cambridge: Cambridge University Press.
Haugen, Einar. 1969. *The Norwegian Language in America: A Study in Bilingual Behavior*. Bloomington, IN: Indiana University Press.

Havy, Mélanie, Camille Bouchon, and Thierry Nazzi. 2015. "Phonetic processing when learning words: The case of bilingual infants." *International Journal of Behavioral Development*. Advance online publication. DOI: 10.1177/0165025415570646.

Kan, Pui Fong, and Kathryn Kohnert. 2005. "Preschoolers learning Hmong and English: Lexical-semantic skills in L1 and L2." *Journal of Speech, Language and Hearing Research*, 48: 372–383.

Kovács, Ágnes Melinda. 2009. Early bilingualism enhances mechanisms of false-belief reasoning. *Developmental Science*, 12 (1): 48–54.

Kuhl, Patricia K., Feng-Ming Tsao, and Huei-Mei Liu. 2003. "Foreign-language experience in infancy: Effects of short-term exposure and social interaction on phonetic learning." *Proceedings of the National Academy of Sciences*, 100 (15): 9096–9101.

Li, Ping, Sara Sepanski, and Xiaowei Zhao. 2006. "Language history questionnaire: A Web-based interface for bilingual research." *Behavior Research Methods*, 38 (2): 202–210.

Luk, Gigi, and Ellen Bialystok. 2013. "Bilingualism is not a categorical variable: Interaction between language proficiency and usage." *Journal of Cognitive Psychology*, 25 (5): 605–621.

Ma, Weiyi, Roberta Michnick Golinkoff, Derek M. Houston, and Kathy Hirsh-Pasek. 2011. "Word learning in infant- and adult-directed speech." *Language Learning and Development*, 7 (3): 185–201.

Mackey, William. 1962. "The description of bilingualism." *Canadian Journal of Linguistics*, 7: 51–85.

Newport, Elissa L. 1990. "Maturational constraints on language learning." *Cognitive Science*, 14 (1): 11–28.

Nguyen, Angela-MinhTu, and Veronica Benet-Martinez. 2007. "Biculturalism unpacked: Components, measurement, individual differences, and outcomes." *Social and Personality Psychology Compass*, 1: 101–114.

Pavlenko, Aneta. 2009. "Conceptual representation in the bilingual lexicon and second language vocabulary learning." In *The Bilingual Mental Lexicon: Interdisciplinary Approaches*, edited by Aneta Pavlenko, 125–160. Bristol: Multilingual Matters.

Pearson, Barbara Zurer, Sylvia C. Fernández, and D. Kimbrough Oller. 1993. "Lexical development in bilingual infants and toddlers: Comparison to monolingual norms." *Language Learning*, 43 (1): 93–120.

Petitto, Laura Ann, Marina Katerelos, Bronna G. Levy, Kristine Gauna, Karine Tetreault, and Vittoria Ferraro. 2001. "Bilingual signed and spoken language acquisition from birth: Implications for the mechanisms underlying early bilingual language acquisition." *Journal of Child Language*, 28 (2): 453–496.

Pierce, Lara J., Denise Klein, Jen-Kai Chen, Audrey Delcenserie, and Fred Genesee. 2014. "Mapping the unconscious maintenance of a lost first language." *Proceedings of the National Academy of Sciences*, 111 (48): 17314–17319.

Place, Silvia, and Erika Hoff. 2010. "Properties of dual language exposure that influence two-year-olds' bilingual proficiency." *Child Development*, 82 (6): 1834–1849.

Ribot, Krystal M., and Erika Hoff. 2014. "'Como estas?' 'I'm good.' Conversational code-switching is related to profiles of expressive and receptive proficiency in Spanish–English bilingual toddlers." *International Journal of Behavioral Development*, 38 (4): 333–341.

Ronjat, Jules. 1913. *Le développement du langage observé chez un enfant bilingue*. Paris: Champion.

Sebastián-Gallés, Núria, Sagrario Echeverría, and Laura Bosch. 2005. "The influence of initial exposure on lexical representation: Comparing early and simultaneous bilinguals." *Journal of Memory and Language*, 52 (2): 240–255.

Silva-Corvalán, Carmen, and Jeanine Treffers-Daller, eds. 2016. *Language Dominance in Bilinguals: Issues of Measurement and Operationalization*. Cambridge: Cambridge University Press.

Weinreich, Uriel. 1953. *Languages in Contact*. New York: Publications of the Linguistic Circle of New York 1.

Weisleder, Adriana, and Anne Fernald. 2013. "Talking to children matters: Early language experience strengthens processing and builds vocabulary." *Psychological Science*, 24 (1): 2143–2152.

Werker, Janet F., and Richard C. Tees. 2005. "Speech perception as a window for understanding plasticity and commitment in language systems of the brain." *Developmental Psychobiology*, 46 (3): 233–251.

Yow, Wei Quin, and Ellen M. Markman. 2011. "Bilingualism and children's use of paralinguistic cues to interpret emotion in speech." *Bilingualism: Language and Cognition*, 14 (4): 562–569.