

Bilingualism

British linguist David Crystal (2000) tells the story of a Johannesburg taxi driver who could speak eleven languages. Crystal was impressed, but the driver saw nothing remarkable about his linguistic abilities—nor any great value in them, either. Instead, his goal in life was to earn enough money so that his children could learn English, the only language worth knowing in his opinion.

Native speakers of English tend to be monolingual, and they also tend to assume one person—one language is the norm. But this assumption is false. Most people in the world speak more than one language, and they do so out of necessity. Immigrants to a new country need to learn a new language, and people living in multiethnic societies, like the South African taxi driver, have to know the languages of their fellow citizens.

In the twenty-first century, English has become the world language of business and science, and today one in four people around the globe speaks English, most of them as a second language (Crystal, 2003). By exploring the experience of being bilingual, we can gain deeper insights into what it means to be human.

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SECTION 9.1: THE BILINGUAL EXPERIENCE

- Most people in the world are bilingual, meaning that they speak two or more languages; however, they rarely speak all of their languages with equal proficiency, and typically one language is preferred or dominant.
- The distinction between language and dialect is based more on political than linguistic considerations; two languages or dialects are said to be mutually intelligible when their speakers can understand each other.

- Language shift among immigrants to the United States follows a predictable three-generation pattern; the first generation speaks the heritage language and some English, the second generation speaks the heritage language but prefers English, and members of the third generation grow up as monolingual English speakers.
- In multilingual societies, one of the languages is often dominant and is used for communication in government, education, and business; in some cases, communication between ethnic groups proceeds through a lingua franca, which is a second language that members of different ethnic groups can also speak.
- Bilinguals engage in codeswitching to select the language that best suits the pragmatics of the situation; codeswitching can occur between or within turns of conversation. Bilinguals will also engage in language negotiation, tentatively trying different languages until the best fit for the current situation is mutually agreed upon.
- Language is a vital component of a person's identity, and bilinguals modify their language use to assert their membership in various social groups; language also influences the emotional recall of memories, with those memories being more vivid and arousing when recalled in the language in which the events were first experienced.

If you're an American, you probably speak English and no other language. You may also assume that most people are **monolingual**, or *able to speak only one language*, just like you. But you would be wrong. In fact, most people in the world today are **bilingual**, meaning they're *able to speak two or more languages*, and monolinguals are the exception (Dixon, Wu, & Daraghmeh, 2012). Two-thirds of the children in the world are growing up in bilingual environments, and even in the United States, one in five school children speaks a language other than English at home (Brito & Barr, 2012).

The Bilingual World

People grow up learning more than one language for a variety of reasons. Globalization has led to an increase in immigration, which usually means learning the language of the new country (Dixon, WU, et al., 2012). There are also regions of the world where bilingualism is the norm because those societies consist of multiple ethnic groups. In such circumstances, people need to be able to speak more than one language in order to be able to fully participate in home and social life; for them bilingualism is a necessity, not a choice (Kay-Raining Bird, Lamond, & Holden, 2012). In addition, the emergence of English as the global language of business and science means that many educated people in most parts of the world have at least some command of English.

Bilingualism comes in varying degrees. *A person who grows up speaking two languages and can communicate equally well in either language* is considered a **balanced bilingual** (Hsu, 2014). However, few bilinguals are truly balanced, and in most cases the person will have a preferred or dominant language. Although we learn the foundation of our

language at home as children, school is also an important environment for language development, especially vocabulary and literacy. Thus, the language the child is educated in will usually become the dominant language in adulthood. Furthermore, people who learn a second language after early childhood rarely develop native speaker proficiency in that language, and in this case the first language learned will usually be the dominant language. Finally, some people will be counted as bilingual or not depending on whether you view the linguistic systems they're familiar with as distinct languages or rather as different dialects of the same language.

Languages and Dialects

Look at a map of Europe and you'll see a patchwork of nations, each with its own language. They speak French in France, Spanish in Spain, Italian in Italy, German in Germany, and so on. But this view of language is simplistic. If you were to travel from Amsterdam to Berlin, sampling the language of each town and village along the way, you would find the standard Dutch of Amsterdam gradually become more German-like until you encountered the standard German of Berlin. Furthermore, people living on either side of the Dutch-German border can understand each other! You'll find a similar transitioning of dialects as you cross many of the other borders in Europe.

Figure 9.1 Map of Europe

Although there are clear-cut political borders in Europe, the linguistic boundaries are blurred.



Because the Netherlands and Germany are different countries, their linguistic systems are treated as different languages. However, you find the same transitioning of dialects from one region to another in China as well. A native of Beijing cannot understand the local dialect of Shanghai, but as you travel from one city to the next, you find that people in adjacent towns can always understand each other. Since China is a single nation-state, the various regional linguistic systems are considered dialects. In other words, the difference between two languages and two dialects is based more on political than on linguistic considerations.

Linguists avoid the language-dialect conundrum altogether by assessing **mutual intelligibility** instead, meaning that they consider *the degree to which speakers of two different languages or dialects can understand each other* (Hsu, 2014). American and British English are mutually intelligible even though there are obvious differences between them. On the other hand, the various major regional dialects of China are not mutually intelligible.

Figure 9.2 Map of Major Chinese Dialects

Although mainland China is a single political unit, its people speak a dozen mutually unintelligible dialects.



Source: Wu Yue (original); Gohu1er (SVG) / CC-BY-SA-3.0.

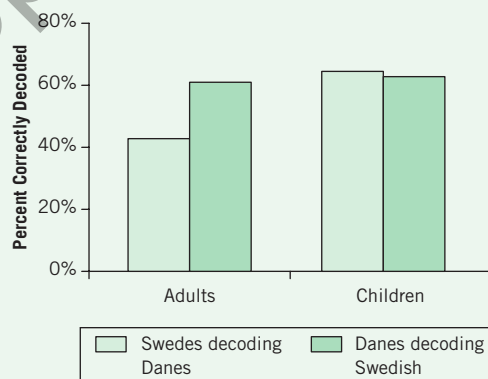
You might assume that if a speaker of Language A can understand a speaker of Language B, the reverse should be true as well. But this is not always the case. For example, the Scandinavian languages of Swedish and Danish are closely related and generally considered to be mutually intelligible (Schüppert & Gooskens, 2011). However, adult Swedes find Danish difficult to understand while adult Danes can easily understand Swedish. Sweden is the dominant country in Scandinavia, and attitudes seem to play a role. In surveys, adult Danes report favorable attitudes about Sweden while adult Swedes indicate less positive attitudes toward Denmark. Considering that preschool Danes and Swedes are equally capable of understanding the other language, it appears that adult Swedes are less willing to understand Danish because of social bias.

Immigration to the United States

Immigration accounts for most instances of bilingualism in the United States, and there's also a very predictable pattern of language shift across generations in immigrant families (Shin & Alba, 2009). The first generation, of course, speaks the **heritage language**, which is *the language spoken in an immigrant's country of origin*. They may also learn English to varying degrees of proficiency, but English rarely becomes their dominant language. The second generation, which was either born in the United States or came to this country at a very early age, generally grows up bilingual, learning the heritage language at home and English at school. Because of the strong economic and social pressure in this country to assimilate to American culture, English becomes

Figure 9.3 Mutual Intelligibility of Danish and Swedish

Swedish adults have more difficulty decoding Danish than Danish adults do Swedish. However, Swedish and Danish preschoolers perform equally well at decoding the other language. This suggests that implicit social attitudes influence the Swedish adults' performance.



Source: Schüppert and Gooskens (2011).

the dominant language of this generation. Furthermore, because they are educated in English, the children of immigrants may not learn to read and write the heritage language without explicit training, and many immigrant communities in the United States maintain after-school or weekend heritage language programs for their children. This second generation grows up with a strong preference for English and frequently marries outside the heritage ethnic group. As a result, their children, who constitute the third generation, typically grows up as monolingual English speakers.

This pattern of language shift is accelerated in the case of older children or young adolescents who immigrate to this country. These children are still in the process of learning their first language when they are thrust into a new environment, and English soon becomes their dominant language (Rothman, 2009). As a result, they often experience **incomplete first-language acquisition**, referring to *the failure to attain full native speaker proficiency of the first language*. In other words, these young first-generation immigrants have language abilities more like those of second-generation immigrants. And likewise their children typically grow up as English monolinguals.

It's important to point out that incomplete first-language acquisition doesn't mean that these bilinguals are deficient in any way (Cabo & Rothman, 2012). People learn languages to the extent that they need to use them. Young immigrants may need to speak enough of the heritage language to communicate with family members about day-to-day matters, but they need to have native speaker proficiency to fully participate in American society. For that matter, the heritage language of adult immigrants also changes over time, since they no longer participate in the society of the country of origin and are inevitably influenced by the language and culture of their new homeland. Again, we see that languages are not categorical linguistic systems but rather exist along a continuum, varying from region to region and even speaker to speaker.

Multigenerational Bilingualism

In many areas of the world, multiple ethnic groups with different languages live side by side. In this case, bilingualism becomes the norm, and each new generation grows up bilingual. One such example is the city-state of Singapore in southeast Asia. Three ethnic groups—Chinese, Malay, and Tamil—live together in this society, and all three languages are spoken there (Dixon, Wu, et al., 2012). As a former British colony, English is the **lingua franca**, which is *a second language in common to all ethnic groups in a given region*. In other words, while the three ethnic groups may not speak each others' languages, they can generally communicate with each other in English. This is especially true of educated Singaporeans, since English is the main language of instruction. English is also the **dominant language** of Singapore, meaning that it is *the language of political and economic power within a bilingual society*. The three ethnic languages are also arranged in a pecking order, with Chinese and Malay having higher status than Tamil. Of course, language status reflects the social status of the various ethnic groups within the community.

Another example of a multilingual society is the Grand Duchy of Luxembourg, a tiny country on the border between France and Germany. Luxembourg is officially a trilingual nation (Engel de Abreu, 2011). The citizens of the Grand Duchy grow up speaking Luxembourgish, but they learn both French and German in school. Although Luxembourgers continue to speak Luxembourgish among themselves, many of them also need to interact on a regular basis with French and German speakers, since Luxembourg City is an international center of politics and finance. In this case, Luxembourgish can't be considered the dominant language, since government and business are mostly conducted in French and German. Rather, the ability to speak Luxembourgish serves as a marker of identity separating locals from foreigners. In fact, it's not uncommon for ethnic minorities included within larger political structures to fiercely maintain their ethnic language across generations as a way to provide an identity separate from that of the dominant society.

Codeswitching

Among bilinguals, their different languages are often associated with different environments or contexts. On the one hand, the heritage language may be used at home with family members, and topics pertaining to home and family life may be more easily expressed in that language. On the other hand, the **societal language**, which is *the language spoken by the majority of people in a given society*, may prove easier to use when discussing topics relevant to issues outside of the home. This may even be the case for first-generation immigrants, whose command of the societal language is relatively weak. Thus, bilinguals will often engage in **codeswitching**, which is *a change from one language to another within a single interaction* (Rontu, 2007). Codeswitching can occur between sentences in a conversation or even within sentences, and it's observed even in young bilingual children.

Codeswitching reflects a deep pragmatic knowledge on the part of the speakers (Angermeyer, 2010). When bilinguals engage in codeswitching, they're not only aware of their interlocutor's language abilities, they also have a good sense of which language will best convey the intended message. In other words, codeswitching is not the result of a language failure but rather arises from the skillful crafting of language to the appropriate context (Greer, 2013).

A more formalized type of codeswitching occurs in the case of translation (Angermeyer, 2010). When persons who speak different languages need to interact, they rely on translators, who are by definition bilingual. In many cases, such as in the United States, native speakers of the dominant language are typically monolingual, and it's the bilingual speakers of the heritage or ethnic language who are called upon to do the translating. The social dynamics of translation are complex, as they involve interactions between members of the dominant and subordinate social classes, and the translator, though able to speak both languages, is still viewed as a member of the subordinate group.

Bilingual speakers' choice of language depends more on pragmatic factors than their own competence (Angermeyer, 2010). First, there's strong pressure to use the local language whenever possible. As a result, immigrant families to the United States tend to speak more English at home the longer they've been in the country. Second, bilingual speakers tend to use the native language of their interlocutor because it increases the likelihood that their intended message will be understood. Finally, in interactions between speakers of the dominant and minority languages, the burden of being understood falls squarely on the speaker of the nondominant language. Thus, minority speakers will take great pains to express themselves in the majority language, knowing full well that the majority language speaker isn't likely to make a similar effort to be understood.

Although young bilingual children sometimes codeswitch due to limitations in one of the languages they're speaking, they also learn the pragmatics of codeswitching at an early age (Khattab, 2013). By the time they're two years old, bilingual children show *sensitivity to the identity or ethnic background of the interlocutor in selecting a language to use*, and this awareness is known as **bilingual accommodation**.

Young bilinguals also become skillful at **language negotiation**, which is *a process in which bilingual interlocutors work together to decide which language to use* (Cromdal, 2013; Lehti-Eklund, 2012). Immigrants and visitors to the United States often need to negotiate language when meeting fellow members of their ethnic group for the first time. As we've seen, ethnic minorities in this country typically lose their heritage language by the second or third generation after immigration; and so the initial exchange is usually in English, with a switch to the ethnic language only after it's been established that both interlocutors are more comfortable with it.

Receptive language abilities generally outpace productive abilities, and this is true for monolinguals as well as bilinguals. For example, although you can understand your teachers' lectures, you probably can't speak with the same level of vocabulary and structural complexity. In the case of immigration, members of the second or third generation may still have *the ability to understand a second language without being able to speak it*, and this capacity is known as **receptive bilingualism** (Herkenrath, 2011). In this situation, the interlocutors each speak in their dominant language but still manage to understand each other.

Mutual intelligibility, as in the case of Danes understanding Swedish, is one example of receptive bilingualism, and it stems from the fact that the two languages are very similar in vocabulary and structure. However, receptive bilingualism can also occur between two languages that are not closely related. For example, French and German are not mutually intelligible, but both are official languages of Switzerland. Most Swiss speak one of these as their native language but can still understand the other language, and sometimes they engage in conversations where one interlocutor speaks French and the other responds in German. Receptive bilingualism also often occurs within immigrant families, in which case the parents or grandparents speak to the children in the heritage language while the children respond in their preferred English.

Language and Identity

Language is an integral part of a person's identity, and bilinguals use language to establish their identity, which may vary as they move from one social group to another (Khattab, 2013). First-generation immigrants typically strive to maintain their heritage identity, and they speak the societal language with an accent that reveals their country of origin. Members of the second generation, however, strive to assimilate to the new culture, and they speak the societal language with the local accent. However, they may opt to speak the local language with a heritage language accent when interacting with members of their ethnic group, especially those who are older.

Language can also have an impact on the emotions experienced when recalling memories, as for example in the case of bilingual psychotherapy (Frie, 2013). Early childhood memories are recalled more vividly and with greater emotion when bilingual clients present them in their native language. Thus, it's often easier for clients to first discuss early traumatic events in their second language, since the emotional experience is dampened. Later in the course of therapy, when clients have already achieved some healing, they may opt to revisit those memories with the therapist in their native language to resolve the meaning of those memories in their lives.

In Sum

Most people in the world speak two or more languages, but in almost all cases they have one preferred or dominant language that forms part of their personal identity. Sometimes speakers of different languages can still understand each other, not because they speak each other's language but because the two languages are similar enough to be mutually intelligible. Immigration language shift in the United States typically occurs across three generations, with the first generation bilingual but dominant in the heritage language, the second generation bilingual but dominant in English, and the third generation monolingual English speaking. In multilingual societies, such as Singapore or Luxembourg, citizens need to be multilingual in order to fully engage in society. Bilinguals engage in codeswitching to maximize communication, taking into account multiple pragmatic factors, such as context, topic, and the language abilities of their interlocutors. Bilinguals also switch languages to identify themselves as members of various social groups as well as to modulate the emotional impact of memories.

Review Questions

1. What does it mean to say that two languages are mutually intelligible? On the one hand, Danish and Swedish are mutually intelligible, yet they are considered different languages. On the other hand, Shanghainese and Cantonese (spoken in Hong Kong) are mutually unintelligible, yet they are considered dialects of Chinese. What then is the distinction between language and dialect?

2. Describe the language shift that occurs across generations among immigrant populations in the United States. Why does this shift occur?
3. What is a lingua franca? In what sense has English become a global lingua franca?
4. Describe the various ways in which bilinguals engage in codeswitching. What sorts of pragmatic and social factors do bilinguals consider as they negotiate language?

Thought Questions

1. How is the language you speak related to your sense of personal identity? Even if you're a monolingual English speaker, do you modify the way you speak to convey different aspects of your personal identity in different situations? Do you ever modify the way you speak in order to conform to the social group you are interacting with?
2. It used to be thought that bilingualism had mostly negative consequences because bilinguals rarely perform as well as monolinguals on single-language tasks. However, it's now well understood that monolingual language performance is not a good measure for language competence for bilinguals. Explain why this is so, given what you have read in this section.

Google It! Codeswitching

If you're interested in **codeswitching**, you can find a number of videos on YouTube that explain the phenomenon in more detail and provide examples.

SECTION 9.2: ORGANIZATION OF THE BILINGUAL MIND

- Both languages are activated in the brains of bilinguals every time they speak, regardless of which language they are currently using; evidence for this assertion comes from cross-language priming, eye-tracking, and electrophysiological studies.
- Translation equivalents are words in two languages that refer to the same concept. Closely related languages share cognates, which are words that have similar forms and meanings in both languages; however, interlingual homographs are “false friends” in that their forms are similar but their meanings are different.
- Bilinguals have smaller vocabularies in each of their languages and more difficulty retrieving words compared with monolinguals; while

this bilingual disadvantage is measurable in the laboratory, it has no discernible impact on the day-to-day activities of the bilingual person.

- The weaker links hypothesis explains the bilingual disadvantage by suggesting that bilinguals are less practiced at using the words they know since they need to split their time between two languages; the interference hypothesis proposes that translation equivalents create interference that slows down lexical access.
- The revised hierarchical model proposes a separate lexicon for each language with links to a common conceptual level; translation occurs either by passing through the conceptual level or via direct links between the two languages.
- The sense model takes into account the fact that most words have multiple meanings that do not fully overlap across languages; extensions of this model also take into account cultural differences in the imagery evoked by words.

Since bilinguals rarely confuse their two languages, it seems logical to assume that the bilingual mind houses each language separately (Bialystok, Craik, & Luk, 2012). However, the empirical evidence clearly shows that balanced bilinguals activate both languages every time they speak, even when using their dominant language or in strictly monolingual situations where only one of the languages would be appropriate (Bialystok, 2011). This parallel activation of the two languages in bilinguals occurs at all levels of speech production (Festman, 2013).

It's less clear whether this is also the case with an **unbalanced bilingual**, that is, *a person who has limited ability in a second language*. However, immersion in the second-language context, as happens for example during study abroad, does have a temporary impact on the speaker's ability to access words and structures in the dominant language (Gutierrez et al., 2012). This second-language interference soon dissipates, though, once the speaker has returned to the environment where the dominant language is used.

Two Tongues in One Head

Evidence for the joint activation of both languages in a bilingual comes from a number of different approaches. The lexical decision task, in which participants decide as quickly as possible whether a letter string is a word or not, shows that bilinguals cannot simply shut off one language when making word judgments in the other language (Poulin-Dubois et al., 2012). For example, the letter string NOCHE is not a word in English, but the reaction time of a Spanish-English bilingual will be slowed down in this case, because it is a word in Spanish.

Additional evidence for joint activation comes from **cross-language priming** (Bialystok et al., 2012). This is *the situation in which a word in one language aids the retrieval of a word with a related meaning in another language*. For instance, in the case of English

monolinguals, the word DOCTOR primes the word NURSE, meaning that reaction time in a lexical decision task is reduced when NURSE follows DOCTOR compared with when it follows an unrelated word. However, in the case of a German-English bilingual, the German word ARZT, which means “doctor,” also primes the English word NURSE.

Eye-tracking studies have also found evidence for joint activation in bilinguals. Imagine you're a participant in the following experiment. On each trial, four pictures appear on the computer screen, and you hear a single English word. Your job is to look at the picture named by the word. So, for example, if the visual array contains pictures of a postage stamp, a flag, a marker, and a dog, and you hear “marker,” your eyes will quickly move to the picture of the marker. However, it's more complicated for a Russian-English bilingual because the Russian word for “postage stamp” is *marka*. Since we often identify words before they're completely spoken, a Russian-English bilingual is just as likely to look first at the postage stamp as at the marker (Marian, Spivey, & Hirsch, 2003).

Even more evidence for joint activation in bilinguals comes from clinical and neuroimaging studies (Bialystok et al., 2012). Although bilinguals frequently engage in codeswitching for pragmatically appropriate purposes, bilingual patients suffering from language-related brain disorders will often make inappropriate language switches or mix words from their two languages. Furthermore, bilinguals in event-related potential (ERP) studies exhibit semantic priming in both languages, as indicated by a reduced N400 component, even when only one of the languages is being used (Martin et al., 2012). Thus, even when bilinguals are merely listening, both languages are active.

Links Between the Two Languages

Although simultaneous interpreters, such as those employed at the United Nations, are highly trained professionals, any bilingual can do a rough-and-ready translation from one of her languages to the other. This observation suggests that the vocabularies of the two languages are linked at the conceptual level. Put simply, whatever you can talk about in one language, you can also talk about in another language. *Words in two different languages that refer to the same concept* are called **translation equivalents**. Thus, *dog* and *chien* are translation equivalents in English and French.

An interesting issue with translation equivalents is how they are learned in the first place, especially in the case of bilingual children who were exposed to both languages from an early age. As we learned in Chapter 5, young children learning the vocabulary of their first language operate according to the principle of mutual exclusivity, meaning that they assume a new word must refer to a novel concept. Suppose a young child growing up in a bilingual home has heard her English-speaking mother refer to the family pet as *dog*, and then later she hears her French-speaking father utter *chien* while talking about the dog. According to the principle of mutual exclusivity, the child should assume *chien* refers to something else, such as the dog's droopy ears or wagging tail. But bilingual children don't act this way and instead readily accept two different words for the same concept (Poulin-Dubois et al., 2012). This suggests that even at a very young

age, children growing up in bilingual environments have some awareness that separate linguistic systems are in use.

Sometimes there are *words in two languages that have similar form and meaning*, and these are known as **cognates**. Cognates occur for two reasons. One reason is that some languages are related to each other and thus share a certain amount of vocabulary. For example, all of the Romance languages, including Spanish, French, and Italian, developed out of the Latin spoken in the Roman empire two thousand years ago. Likewise, the Germanic languages, including German, Dutch, English, and the Scandinavian languages, developed out of a common tongue spoken in central Europe a few thousand years ago. Hence, German and English share a number of cognates, such as *Mann-man*, *Fisch-fish*, *Wein-wine*, and *Bier-beer*. The other reason for cognates is that languages often borrow the names for concepts they acquire from other cultures. For instance, the German-English cognates *Kaffee-coffee* occur because both languages borrowed the name along with the beverage from the Turks.

Cross-language priming studies yield a different pattern of results for cognates and noncognates (Wang, 2013). Recall that most bilinguals have one language (L1) that is stronger than the other language (L2). In the case of cognates, robust priming effects occur in either direction, that is, whether from L1 to L2 or from L2 to L1. For example, either KAFFEE or COFFEE primes TEA for a German-English bilingual. In the case of noncognates, however, priming effects are asymmetrical. If German is the speaker's dominant language, then ARTZ ("doctor") will prime NURSE, but NURSE may not prime ARTZ.

Table 9.1 Some English Cognates With German and French

English has many cognates with German because both languages have a common ancestor. English has many cognates with French because of widespread borrowing after the Norman Conquest of 1066.

English	German	English	French
house	Haus	reason	raison
God	Gott	season	saison
land	Land	beef	boeuf
friend	Freund	biscuit	biscuit
sun	Sonne	bouquet	bouquet
moon	Mond	robe	robe
mother	Mutter	gourmet	gourmet
brother	Bruder	lingerie	lingerie
son	Sohn	pardon	pardon

Appearances may be deceiving, and there are *words in two languages that have similar form but different meanings*. These are technically known as **interlingual homographs**, but they are often called “false friends” in the literature. For example, never accept a *Gift* from a German because it’s *poison*. Likewise, *Chef* means “boss” in German, not a person who’s skilled at cooking. Bilinguals know these “false friends” have different meanings in each of their languages. Nevertheless, both meanings of an interlingual homograph are temporarily activated, as measured by the event-related potential (ERP) component N400, which is elicited when a semantic expectation is violated. For example, the word pair *Gift-deadly* should elicit a stronger N400 component in an English monolingual, because the meanings are unrelated, compared with a German-English bilingual, who finds a meaningful relationship across the two languages. Again, such results indicate that both languages are activated regardless of which language the bilingual is speaking.

The Bilingual Disadvantage

While fears that raising a child bilingual will only lead to confusion are ungrounded, speaking two languages does have an impact on language abilities. The term **bilingual disadvantage** refers to *the observation that bilinguals have smaller vocabularies in each of their languages and more difficulty retrieving words compared with monolinguals* (Bialystok et al., 2012). This is true for both receptive and expressive vocabulary, and at all ages, from elementary school to adulthood, as measured by standardized tests (Poulin-Dubois et al., 2012).

The bilingual disadvantage can be measured using a variety of laboratory tasks. Bilinguals make slower responses and are less accurate on picture naming tasks (Festman, 2013). They’re also slower and come up with fewer items in a **semantic categorization task**, which is *an experimental procedure that asks participants to name members of a given category* (Gutierrez et al., 2012; Wang, 2013). Thus, bilinguals can typically name fewer kinds of bird or pieces of furniture than a monolingual can, and it takes them more time to do so.

The lexical decision task is also more difficult for bilinguals than monolinguals (Martin et al., 2012). Monolinguals can discriminate words from nonwords without considering the meanings of the words, as evidenced by N400 modulation. However, bilinguals show semantic processing for both words and nonwords. It appears that bilinguals perform the lexical decision task by considering whether each letter string is meaningful while monolinguals do so by considering the surface form of the string.

Compared with monolinguals, bilinguals experience more tip-of-the-tongue states (Wodniecka et al., 2010). The tip-of-the-tongue phenomenon, when you know that you know a word or name but can’t say it at the moment, is generally interpreted as a temporary difficulty in lexical retrieval, and it’s more common with words that are used less frequently. Since bilinguals split their time between two languages, they’ll use any given word less often than a monolingual would. Hence, some researchers have made *the proposal that the bilingual disadvantage can be explained in terms of lower word*

frequencies (Gollan & Goldrick, 2012). This is known as the **weaker links hypothesis** (Poulin-Dubois et al., 2012). According to this view, bilinguals are less practiced at using the words they know compared with monolinguals, and so they have more difficulty accessing them.

An alternative explanation for the bilingual disadvantage in lexical retrieval is the **interference hypothesis**. This is *the proposal that the bilingual disadvantage can be explained in terms of interference from translation equivalents in the unused language* (Gollan & Goldrick, 2012). Since bilinguals can never simply turn off the other language when they're speaking, the two languages will always compete for activation, and this competition leads to interference in lexical access that slows the process down (Festman, 2013). In other words, bilingual speakers need to be constantly inhibiting intrusions from the unintended language, thus making lexical access more effortful (Poulin-Dubois et al., 2012). We'll revisit the inhibition in the next section.

While the bilingual disadvantage is clearly measurable in the laboratory, it's also important to note that it doesn't lead to any noticeable language problems in real life. In fact, bilinguals rarely experience overt intrusions of the unintended language, and instead they skillfully navigate between their two languages with a high degree of accuracy (Bialystok et al., 2012). Furthermore, when the two languages are closely related, the bilingual disadvantage can be reduced. For example, Spanish and Catalan are closely related and share many cognates. While Catalan-Spanish speakers still exhibit the bilingual disadvantage, they also experience a boost in performance in the case of cognates (Kamat et al., 2012).

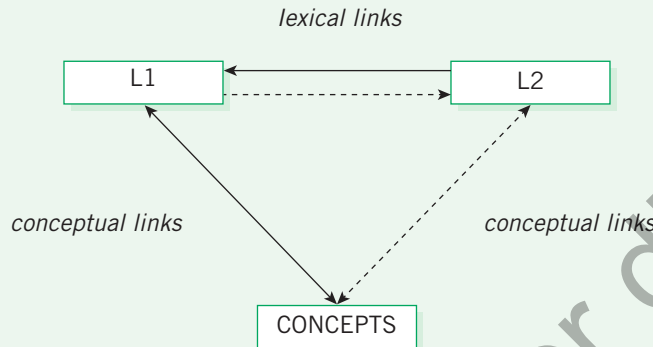
Models of the Bilingual Lexicon

Several models have been proposed to explain how the vocabularies of the two languages are organized in the bilingual mind. Perhaps the most influential has been the **revised hierarchical model**, first proposed by Kroll and Stewart (1994). This is *a theory of bilingual language processing that assumes separate lexicons for each language connected by a common underlying conceptual level*. The two lexicons are connected directly by lexical links and indirectly by conceptual links that run through the conceptual level (X. Luo et al., 2013). The strength of each link depends on the proficiency of the bilingual. In the case of the truly balanced bilingual, all links will be strong, and the speaker should be able to translate words just as quickly from L2 to L1 as from L1 to L2. Likewise, cross-linguistic priming should occur in either direction.

In the case where one language is dominant, the revised hierarchical model proposes that some of the links are weaker than others. First, the lexical link from L1 to L2 is weaker than in the opposite direction. This arrangement represents the observation that it's usually easier to translate words from the weaker to the stronger language than from the stronger to the weaker language. If you've ever studied a foreign language, you should have some intuitions about this. It should be easier for you to give the English translations for a list of common words in the foreign language than it is to give the foreign language

Figure 9.4 The Revised Hierarchical Model

The revised hierarchical model proposes separate lexicons for each language with an underlying common conceptual layer. Solid links are strong, and dotted links are weak, reflecting data from translation and cross-language priming tasks.



Source: Kroll and Stewart (1994).

equivalents for a list of common English words. As second-language learners become more proficient, they also create conceptual links between L2 and the conceptual core, but these links are weaker because they are less practiced than the L1 conceptual links.

The revised hierarchical model explains asymmetrical cross-language priming by assuming that priming takes place at the conceptual level (Wang, 2013). Since the links from L1 conceptual links are strong, they induce priming that spreads to L2. However, the weaker L2 conceptual links produce less activation in the conceptual level, and as a result there's less priming. The lexical links in the revised hierarchical model are there to account for translation data, but it's unclear why priming can't proceed through the lexical links, in which case priming from L2 to L1 should be stronger, which is not what we find.

Another weakness of the revised hierarchical model is that it doesn't take into account the fact that so-called translation equivalents rarely have exactly the same meaning (Jared, Poh, & Paivio, 2013). For example, the Russian translation equivalent for *cup* is *chashka*, and the translation equivalent for *glass* is *stakan*. In English, if a drinking vessel is made of glass, it's called a *glass*, otherwise it's a *cup*. But in Russian, the distinction is whether the vessel has a handle or not. Thus, a paper coffee cup is a *stakan*, not a *chashka*.

The more abstract the concept, the more the meanings of translation equivalents diverge. Verbs are more abstract than nouns, and they're notoriously difficult to translate. Take for instance the English-Chinese translation equivalents *open-kāi*. While the Chinese verb *kāi* can be used in virtually any context that you would use the English verb *open*, such as open a door, a window, a bank account, or a book, it's also the verb that's used in expressions such as "turn on a light" (*kāi dēng*) and "drive a car" (*kāi chē*).

Figure 9.5 Chashka or Stakan?

Even translation equivalents for common objects often have non-overlapping meanings. Compare the English words *cup* and *glass* with the Russian words *chashka* and *stakan*.



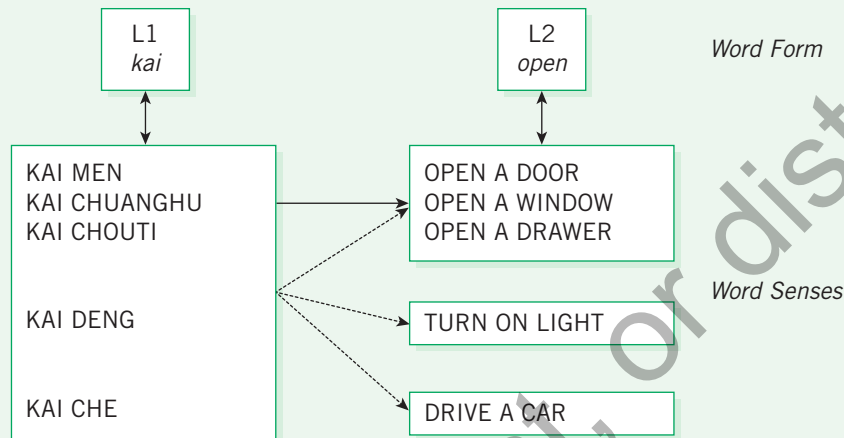
Source: (a) ©iStockphoto.com/RTimages. (b) ©iStockphoto.com/inkit. (c) ©iStockphoto.com/ fcafotodigital.

The **sense model** is a theory of bilingual language processing that takes into account the fact that most words have multiple meanings that do not fully overlap across languages (Wang, 2013). According to the sense model, priming activates all senses, or meanings, of a word. Cross-language priming, then, depends on how many shared senses there are between the translation equivalents (X. Luo et al., 2013). Because the bilingual will likely know only a few senses of the L2 word, almost all of which will map onto meanings of the L1 equivalent, cross-language priming from L2 to L1 is more likely to occur. However, the bilingual knows many more senses for the L1 word, many of which will not map onto the senses of the L2 equivalent; hence cross-language priming from L1 to L2 is less likely to happen. Another strength of the sense model is that it can account for the observation that bilinguals are faster at translating concrete words, which tend to have more overlapping meanings, than they are at abstract words (Kauschanskaya & Rechtzigel, 2012).

Words don't just link with abstract concepts, they can also elicit powerful imagery that can vary by culture (Jared et al., 2013). Thus, even very close translation equivalents can be associated with different prototypical images in the two languages. For instance, the English-Chinese translation equivalents *dragon* and *lóng* closely overlap in meaning, in that both refer to a mythological fire-breathing reptile. However, there are subtle differences between the prototypical image of a dragon in the East and West. In a

Figure 9.6 Sense Model

According to the sense model, translation priming from L2 to L1 is strong because all L2 senses map onto L1 senses. However, translation priming from L1 to L2 is weak because only a few L1 senses map onto L2 senses. The model predicts that, for a native speaker of Chinese, priming for *open-kai* should be stronger than that for *kai-open* because *kai* has other senses that don't map onto *open*.



Source: Finkbeiner et al. (2004).

picture naming task, Chinese-English bilinguals named Chinese-typical pictures faster when they responded in Chinese and named Western-typical pictures faster when they responded in English. These results provide clear evidence that word meaning is more than just abstract conceptual knowledge but also includes visual and probably other sensory information. This interpretation is also consistent with the notion of embodied cognition, which proposes that we understand language by activating the relevant perceptual and motor areas of the brain.

In Sum

Whenever bilinguals speak, both of their languages are activated, even in situations that highly bias only one of those languages. Joint activation in bilinguals has been measured through a number of experimental techniques, including both behavioral and brain imaging methods, and it has also been ascertained through clinical data. Pairs of words in two languages that have the same meaning are known as translation equivalents. When they also share a similar form, they're known as cognates. On the other hand, interlingual homographs are false friends, since they have the same form but different meanings. Bilinguals experience a disadvantage in terms of reduced vocabulary size for each language and also slower lexical retrieval,

Figure 9.7 Dragons

In a picture-naming task, Chinese-English bilinguals are faster to respond *lóng* when they see the Chinese-typical image, and they're faster to respond *dragon* when they see the Western-typical image.

(a) Chinese-typical image of a dragon



(b) Western-typical image of a dragon



Source: ©iStockphoto.com/ Tomboy2290.

even in their dominant language. Although the bilingual disadvantage is measurable, it causes no discernable detriment to the daily activities of bilingual speakers. In part the bilingual disadvantage may be due to lack of practice, since bilinguals split their time between two languages. The disadvantage may also result from interference or competition from the unintended language. The revised hierarchical model views the bilingual mind as composed of two separate lexicons united by an underlying common conceptual level. Conversely, the sense model recognizes that words have multiple meanings, not all of which will match up across languages. Extensions of the sense model also consider cultural differences in the imagery evoked by words.

Review Questions

1. Review the evidence for the joint activity of both languages of a bilingual. Consider the results from the lexical decision task, cross-language priming, and eye-tracking, as well as clinical and electrophysiological data.
2. Explain the concepts of translation equivalents, cognates, and interlingual homographs.
3. What is the bilingual disadvantage? How is it explained in terms of the weaker links hypothesis and the interference hypothesis?
4. Describe the revised hierarchical model. How does it explain translation and cross-language priming effects? What are its weaknesses? Describe the sense model and how it accounts for translation and priming effects.

Thought Questions

1. Young children growing up bilingual need to override the mutual exclusivity principle in order to learn translation equivalents in their two languages. What sorts of linguistic or pragmatic cues might enable them to do this?
2. If you know another language in addition to English, perhaps you can come up with some examples of translation equivalents with non-overlapping senses, such as the English-Russian pairs *cup-chashka* and *glass-stakan*.

Google It! Myths About Bilingual Children

In English-dominant North America, it's often believed that raising children to be bilingual can have a negative impact on their development. On YouTube, you can find informative videos by professionals in the field that dismiss common **myths about bilingual children**.

SECTION 9.3: COGNITIVE BENEFITS OF BILINGUALISM

- Bilinguals' ability to quickly and accurately switch from one language to another carries over to other nonverbal cognitive tasks; living with two languages also leads to a better understanding about the nature of language (metalinguistic awareness), and this has a positive impact on creative thought processes as well.
- The bilingual advantage in nonverbal tasks is based on three cognitive skills: interference inhibition, selective attention, and mental flexibility; these three processes work together to produce executive control, which manages cognitive resources to yield efficient performance.
- Lifelong bilinguals generally outperform monolinguals on tests of executive control, but the bilingual advantage is more robust in early childhood and also in later adulthood; those who learn a second language later in life tend to perform more like monolinguals on these tasks.
- Structural brain differences between lifelong bilinguals and monolinguals account for the bilingual advantage; these include increased activity in the executive control centers in the prefrontal and inferior parietal regions, greater white matter integrity, and increased gray matter volume in the classical language areas as well as in the auditory cortex.

- The term *cognitive reserve* refers to the ability to resist the debilitating effects of dementia in old age; regularly engaging in stimulating mental or physical activity throughout the lifespan helps develop cognitive reserve, as does lifelong bilingualism.
- Despite the concerns of many practitioners, raising children with language disorders as bilinguals causes no additional delays in development; furthermore, the social isolation that results from denying these children access to the heritage language can lead to cognitive and behavioral problems.

As we saw in Section 9.2, bilinguals experience some disadvantages in processing their languages, especially with regard to lexical decision and semantic categorization tasks, which rely on efficient lexical retrieval from a large vocabulary (Hsu, 2014). However, at a more global level, bilinguals exhibit superior language processing abilities relative to their monolingual peers.

Compared with monolinguals, bilingual children display heightened **metalinguistic awareness**, which allows them to use their *understanding about how language works* to make effective choices regarding how to communicate with other people (Lauchlan, Parisi, & Fadda, 2012).

In addition, a number of studies have found a bilingual advantage for tasks involving creativity and problem-solving skills (Lee & Kim, 2011; Leikin, 2012). This is especially true when those tasks require symbolic flexibility or concept formation (Lauchlan et al., 2012). For example, bilinguals are better than monolinguals at learning arbitrary names for objects. This skill no doubt stems from their metalinguistic awareness that words are arbitrary symbols, a fact that may not be intuitively obvious to monolinguals.

Executive Control

Recall that bilinguals experience joint activation whenever they use language, and so they need to carefully monitor the language they're using to avoid intrusions from the other language. The **adaptive control hypothesis** is a *proposal suggesting that bilinguals' constant need to monitor and control their languages leads to benefits in nonverbal cognition* (Bobb, Wodniecka, & Kroll, 2013). For example, bilinguals are better than monolinguals at multitasking, which involves quickly switching attention from one cognitive task to another (Engel de Abreu, 2011). In other words, it appears that bilinguals use general purpose mechanisms as they switch from language to language, and so the constant practice they get in the linguistic realm carries over to other perceptual and cognitive functions as well.

Three basic cognitive processes underlie the bilingual advantage. The first is *the ability to ignore distracting or misleading information*, which is known as **interference inhibition** (Lauchlan et al., 2012). From an early age, bilinguals hone their skills

at inhibiting interference from the unintended language. The second is **selective attention**, which is *the ability to direct and focus attention on the current task* (Hsu, 2014). Since bilinguals need to take into account pragmatic factors such as which language is appropriate in the current context, they also are highly practiced at selective attention. The third is **mental flexibility**, or *the ability to rapidly switch from one cognitive task to another* (Nicolay & Poncelet, 2013). Bilinguals regularly change from one language to another according to pragmatic demands, and mental flexibility is especially important in the case of code switching, where language shifts occur within sentences.

These three abilities are components of a larger system known as **executive control**, which involves *the management of cognitive resources to perform tasks efficiently* (Wodniecka et al., 2010). Executive control can be measured in a number of ways, and generally bilinguals outperform monolinguals, especially on tasks that don't have a verbal component.

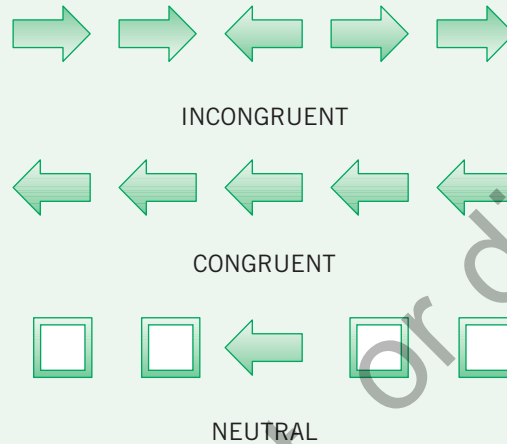
One measure of executive control is the **Simon task**, which is *an experimental procedure that requires participants to respond to the color of a stimulus regardless of its location* (Nicolay & Poncelet, 2013). Imagine you're seated before a computer screen and a keyboard with two buttons. You're told to press the right key when you see a red target and the left key when you see a green target. If the red target appears on the right side of the screen or the green target on the left (the congruent condition), your reaction time will be faster than if the targets are on the opposite side of the screen (the incongruent condition). However, bilinguals show less reduction in speed during the incongruent trials compared to monolinguals.

Another measure of executive control is the **flanker task**. This is *an experimental procedure in which participants respond to the direction of the central arrow in an array, regardless of the direction the other arrows are pointing* (Nicolay & Poncelet, 2013). For example, if you see the array >>>>>, you'll press the right key because the central arrow is pointing to the right. On congruent trials, all arrows point either left or right, but on incongruent trials, the flanker arrows point in the opposite direction of the central, as in >><<>. This time, you need to press the left key. As with the Simon task, participants respond faster during congruent than incongruent trials, but bilinguals are less affected by incongruent trials than monolinguals are (Hsu, 2014).

Bilinguals generally exhibit greater executive control than age-matched monolinguals, but the bilingual advantage is more pronounced among some age groups than others (Bialystok et al., 2012). In monolingual populations, executive control develops late in childhood, peaks in young adulthood, and then declines in middle age. However, bilingual children develop executive control early through their constant need to negotiate language use, and likewise they have to maintain a high level of executive control throughout their life as they balance their two languages. Thus, children and older adults show a clear bilingual advantage in executive control, but the advantage isn't always found in bilingual young adults. This is because they are competing with

Figure 9.8 Flanker Task

The flanker task is a common test of executive control. The participant responds by pressing the left or right button, according to the direction of the middle arrow. Lifelong bilinguals typically outperform monolinguals in the Incongruent condition of this task.



Source: Janessaag / CC-BY-SA-3.0.

monolinguals that are also at their peak cognitive functioning, and only when the task is extremely demanding does a bilingual advantage emerge.

The cognitive benefits of bilingualism are evident in those who've grown up speaking both languages and are more or less balanced in their language proficiency as adults. In the case of nonbalanced bilinguals, who clearly have greater proficiency in one of the languages than the other, the circumstances in which the second language was learned has an impact on the type of cognitive advantages that develop (Salvatierra & Rosselli, 2010).

On the one hand, a high level of proficiency in the second language leads to better performance on tasks requiring metalinguistic awareness; on the other hand, length of time using the second language is a better predictor of executive control (Bialystok & Barac, 2012). Thus, the Spanish major who spends a year abroad in Mexico and then gets a job where she uses her Spanish on an occasional basis may enjoy increased metalinguistic skills, but her performance on executive control tasks will likely be no different from that of a monolingual. Conversely, the immigrant who has spent most of his life in the host country but has only developed basic proficiency in the societal language, which he uses on a daily basis, may exhibit increased executive control while performing more like a monolingual on metalinguistic awareness tasks.

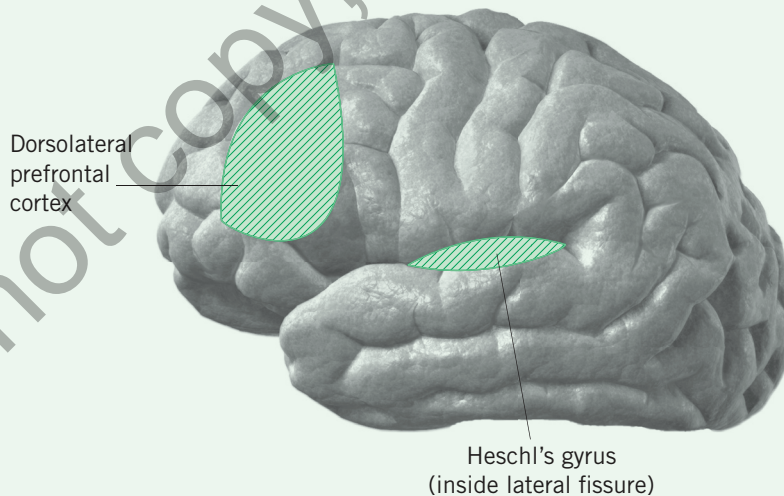
The Bilingual Brain

Neuroimaging studies show structural brain differences between bilinguals and monolinguals. Since bilingualism is not a choice, it's clear that these changes in the bilingual brain are due to the experience of living with two languages. It was already known that the brain center for executive control is in the frontal lobe, so it's not at all surprising to find greater activation in the frontal lobes of bilinguals engaged in tasks requiring executive control (Bialystok et al., 2012). More specifically, the **dorsolateral prefrontal cortex** is known to be *an area of the brain involved in executive control*, and this area becomes active during language switching tasks (Bialystok et al., 2012). The frontal lobe is involved in nonverbal switching tasks as well, but the pattern of activation is different, with more right-side activity for monolinguals and more left-side activity for bilinguals, perhaps because of greater activity of this system for managing their languages (Garbin et al., 2010).

The frontal cortex, as the center for executive control, exerts its influence on other brain regions through a system of white matter tracts running front to back (Bialystok et al., 2012). Neuroimaging studies of young bilinguals show that they recruit a more diverse array of brain regions, compared with their monolingual peers, when they engage in nonverbal tasks requiring executive control (Luk et al., 2011). Presumably,

Figure 9.9 Dorsolateral Prefrontal Cortex and Heschl's Gyrus

Bilinguals exhibit greater activation in the dorsolateral prefrontal cortex, which is responsible for executive control, compared with monolinguals. They also have larger Heschl's gyri, the structure deep inside the lateral fissure where the auditory cortex is located.



these various regions are connected to the executive control center in the frontal lobe. Executive control of language-related tasks have been found to involve two distinct networks (Christoffels, Kroll, & Bajo, 2013). One network involves white fiber tracts extending from the frontal lobe to the basal ganglia and back, and this system seems to be involved in the inhibition of the unintended language during speech. The other network involves white matter tracts extending from the frontal to the parietal lobes, and this system is implicated in switching tasks, whether language related or not.

Lifelong bilingualism leads to increases in gray matter density not only in the classical language areas but also in regions involved in executive control (Kruchinina et al., 2012). In addition to the executive control center in the prefrontal cortex, which is predominantly responsible for inhibition of inappropriate responses, the left inferior parietal region is recruited for tasks that require selective attention, and brain imaging studies show increased density of gray matter in this area in bilinguals compared with monolinguals (Bialystok et al., 2012). Furthermore, this increase in parietal gray matter density was positively correlated with second-language proficiency and negatively correlated with the age at which the bilinguals acquired the second language (Luk, De Sa, & Bialystok, 2011). In other words, it was the lifelong balanced bilinguals who exhibited the increase in brain mass.

Auditory perception is also affected by bilingualism (Ressel et al., 2012). Recall from Chapter 3 that the auditory cortex is located deep in the lateral fissure on a structure known as Heschl's gyrus. Typically, Heschl's gyrus is larger in lifelong balanced bilinguals than it is in monolinguals, even when other potential factors, such as socioeconomic status, education, or musical experience, are controlled for. Furthermore, the size of Heschl's gyrus is correlated with the ability to quickly learn new consonantal or tonal contrasts not in either of the bilingual's two languages. You should remember that young infants are able to discriminate all possible speech sound contrasts, losing all but those relevant to their native language by their first birthday. However, it seems that lifelong bilinguals maintain some of this neural plasticity from infancy.

Cognitive Reserve

The saying “use it or lose it” applies just as much to your brain as it does to your body. Ample research supports *the notion that engaging in stimulating mental or physical activity on a regular basis helps maintain cognitive functioning as we age and protects against dementia* (Bialystok et al., 2012). A number of factors contribute to **cognitive reserve**, including level of formal education and occupational status, which typically lead to higher socioeconomic class and better health overall. Likewise, regular physical exercise and stimulating leisure activities as well as social engagement all boost cognitive reserve. In addition to these various factors, lifelong bilingualism has been shown to provide cognitive reserve (Bialystok, 2011).

At the level of the brain, cognitive reserve is based on maintaining white matter integrity and gray matter volume (Luk et al., 2011). As we age, the white matter tracts,

which connect different functional areas, tend to deteriorate, and the volume of gray matter, which performs those functions, tends to shrink. However, older bilinguals show less reduction of white and gray matter compared with monolinguals, suggesting that living with two languages is sufficiently stimulating mentally to provide some protection against brain atrophy and dementia.

Even when aging bilinguals do develop dementia, they still fare better than their monolingual peers. One study looking at clinical records found that lifelong bilingual patients were, on average, four years older than monolingual patients when symptoms of Alzheimer's disease were first diagnosed (Bialystok, 2011). It could be that balancing two languages for a lifetime provides cognitive reserve that gives bilingual brains additional time before they succumb to the disease, but brain imaging studies tell a more complex story. When the brains of bilingual and monolingual patients at similar stages of Alzheimer's disease were studied using a neuroimaging technique called computed tomography, it was found that the bilingual brains had incurred far more atrophy than the monolingual brains (Schweizer et al., 2012). In other words, the bilinguals were still functioning at a higher level than were the monolinguals even though they had experienced more advanced deterioration of the brain areas typically affected by Alzheimer's disease. It's believed that the greater white matter connectivity and increased gray matter in other areas of the bilingual brain were compensating for the areas affected by the disease.

Bilingualism is one source of cognitive reserve, but it doesn't confer any additional benefit beyond that provided by physical or intellectual stimulation (Gollan et al., 2011). In other words, well-educated individuals will not show any additional benefit for being bilingual, but among those with lower levels of education, bilingualism does provide protection against dementia in old age. Moreover, bilingualism provides cognitive reserve for younger populations, too. Bilingual children growing up in poverty conditions perform better on nonverbal cognitive tasks than do their monolingual peers living in similar conditions (Engel de Abreu et al., 2012).

Bilingualism and Language Disorders

Children with specific language impairment (SLI) or autism spectrum disorder experience developmental delays in both language and cognition. When such a child is born in an immigrant family, there's additional concern about how the bilingual environment will affect language development, and many educational and clinical professions advise the family to speak only English to simplify the language environment (Bialystok et al., 2012). However, this attitude is based on the unwarranted fear that bilingualism will cause further delays for the child.

Studies comparing bilingual and monolingual children with autism spectrum disorder found no differences in cognitive functioning or language development (Valicenti-McDermott et al., 2013). Similar findings are reported for children with SLI (Kay-Raining Bird et al., 2012). In other words, children with these disorders growing

Figure 9.10 Cognitive Reserve

Engaging in stimulating mental or physical activity on a regular basis helps maintain cognitive functioning and protect against dementia as we age. Lifelong bilingualism confers cognitive reserve as well.



Source: ©iStockphoto.com/ kali9.

up in a bilingual home learn both languages to the same extent that monolingual children with these disorders learn their single language. Thus, there's no evidence that bilingualism is detrimental either to autism spectrum disorder or SLI.

In fact, enforcing an English-only policy in the bilingual household may be problematic for a number of reasons (Korkman et al., 2012). On the one hand, if the parents or grandparents don't speak English well, they are limited in how much they can communicate; furthermore, they may provide a poor model for the child. On the other hand, not teaching the child the heritage language limits his or her engagement with the family and the larger immigrant community, and this social isolation may exacerbate developmental and behavioral problems. Furthermore, the child may even benefit from the cognitive advantages, such as increased interference inhibition and selective attention that accrue from balancing two languages in daily life (Yu, 2013).

In Sum

Because bilinguals live with two languages, they have greater metalinguistic awareness, and this can lead to improvements in creativity and problem solving. Furthermore, their need to juggle two languages yields increases in executive control, which is the general ability to manage cognitive resources such as attention for efficient performance. Lifelong bilinguals generally outperform monolinguals on tasks requiring

executive control, but the bilingual advantage is more evident in early childhood and later adulthood. Underlying the bilingual advantage are structural brain differences that include increased activity in prefrontal and inferior parietal areas, which are known to be responsible for executive control, as well as increased white matter integrity and gray matter volume. These structural differences in bilingual brains also yield greater cognitive reserve, which is the ability to fend off dementia in old age. Many practitioners fear that raising children with language disorders as bilinguals will lead to developmental delays, but research shows that these concerns are unfounded. Furthermore, these children may benefit from the enhanced executive control and extended social networks that bilingualism provides.

Review Questions

1. What is metalinguistic awareness, and what sorts of knowledge would it include? How might metalinguistic awareness improve problem solving and creativity?
2. What is executive control, and what are its three component processes? Describe some of the ways executive control is measured. How does the adaptive control hypothesis explain why lifelong bilinguals tend to have better executive control than their monolingual peers?
3. Describe the various differences in brain structure between lifelong bilinguals and monolinguals that account for the bilingual advantage in executive control.
4. What is cognitive reserve? What is the evidence that lifelong bilingualism confers cognitive reserve? What other factors contribute to cognitive reserve?
5. Discuss the issues surrounding bilingualism and children with language disorders. Why might an English-only policy be detrimental to the child?

Thought Questions

1. The adaptive control hypothesis can explain why lifelong bilingualism confers cognitive reserve, but consider some of the reasons why regular physical and social activity provide protection from dementia. In particular, think about how the brain is engaged during these activities.
2. Marc and Suzie are a monolingual English-speaking American couple who want to provide their newborn daughter with the cognitive advantages of being a lifelong bilingual. So they've purchased audio recordings of French nursery songs and videos of French-language programs for children. They also plan to enroll her in Saturday

morning French school as soon as she turns three years old. Given what you've read in this section, what will be the result of all these efforts? Explain your reasoning.

Google It! The Bilingual Advantage

If you're interested in learning more about the **cognitive benefits of bilingualism**, google it! Another useful search term is **bilingual advantage**. You can find informative articles and videos that discuss the unexpected benefits of speaking another language.

SECTION 9.4: SECOND-LANGUAGE ACQUISITION

- Ultimate attainment in a second language acquired before puberty is largely predicted by two factors, age of arrival and length of residence in the country where the second language is spoken; after puberty, other factors better account for ultimate attainment.
- The critical period hypothesis explains the effect that age of arrival has on ultimate attainment in second-language acquisition by proposing that children have a biological predisposition to learn languages, which they lose after puberty due to a reduction in cerebral plasticity.
- The speech learning model explains ultimate attainment in a second language in terms of the time spent using the two languages in communicative contexts; under the right conditions, a near native speaker accent can be acquired at any age.
- Some bilingual children grow up in homes where each parent speaks a different language. Others grow up with one language at home and a different language outside. And still others grow up in a bilingual environment where both languages are mixed freely. The key to success in raising bilingual children is to make both languages meaningful.
- There are two approaches to bilingual education. Transitional programs aim to assimilate heritage language students into the mainstream language and culture, while two-way immersion programs aim to develop fully bilingual and biliterate individuals. Transitional programs run the risk of first-language attrition.
- While children are better than adults at acquiring native-like skill at pronunciation and grammar, adults are faster at learning vocabulary. In the early stages of second-language acquisition, adults outperform children, but the adults typically stall while children develop into native speakers.

It's widely believed that children learn languages faster and better than adults. When a family moves to a new country, the kids pick up on the new language on the streets as they play with other children, while the parents need special classes, and even then they rarely master the language. This scenario has some truth to it, but the reality is far more complex (DeKeyser, 2013). Although children have some advantages when it comes to learning language, adults can also master a second language under the right conditions.

Ultimate Attainment

Monolinguals virtually always achieve native speaker mastery of their language in terms of pronunciation, grammar, and vocabulary, but the final outcome for second-language learners is more variable. Adult immigrants tend to learn some amount of the new language and then reach *the endpoint of second language acquisition that typically falls short of full mastery*. This is known as the language learner's **ultimate attainment** (Hayashi & Murphy, 2013). In other words, individuals vary widely in how successful they are at learning a second language, ranging from basic survival level with a heavy accent to nearly native speaker proficiency.

The most difficult aspect of a second language to master is its pronunciation (Hopp & Schmid, 2013). Because of subtle differences between languages in terms of consonant and vowel quality as well as prosodic and stress patterns, second-language learners almost always speak with a foreign accent, unless they learned the second language in very early childhood (Saito & Brajot, 2013). As a general rule, those who learn the language before puberty develop native or near native proficiency, while those who learn the language after puberty will speak with a foreign accent even if their ultimate attainment is very high in all other aspects (Serratrice, 2013).

Many factors contribute to the ultimate attainment of a second-language learner, but two in particular have been the focus of research (Saito & Brajot, 2013). The first factor is **age of arrival**, which is *the time when the learner receives the first intensive exposure to the second language in the country where it is spoken*. Immigrants often have some formal training in the second language before leaving their home country, especially when they're adults, but it's usually not until after arrival in the new country that they use the second language for communication. The second factor is **length of residence**, referring to *the number of years the learner has lived in the country where the second language is spoken*. Regardless of age of arrival, it takes many years to master a language.

For those who come to the new country before puberty, age of arrival and length of residence are very good predictors of ultimate attainment, including whether the individual will speak with a detectable foreign accent (Saito & Brajot, 2013). Thus, even a young child living in the new country less than year can't be expected to speak like her peers just yet, but she probably won't have a noticeable foreign accent in a few years' time. Likewise, the individual that arrived just before puberty will likely still speak with a slight accent even after living in the new country for decades (Hopp & Schmid, 2013).

Figure 9.11 Age of Arrival and Ultimate Attainment in a Second Language

As a general rule, the earlier second-language learners arrive in the country where the language is spoken, the greater their ultimate attainment.



Source: Vanhove (2013).

After puberty, age of arrival and length of residence are no longer good predictors of ultimate attainment (Saito & Brajot, 2013). Virtually all adult second-language learners speak with a foreign accent even if they have excellent mastery of the language. Perhaps you've had a professor from another country who has a far better command of English vocabulary than you do but speaks with a foreign accent. On the other hand, many adult second-language learners fall short—often far short—of full mastery, even though they've lived in the new country for decades. The factors that influence the ultimate attainment of later language learners are complex and not well understood. Since many immigrants live in heritage language enclaves, it may be that they learn the second language only to the extent that they need it in their daily lives.

Critical Period Hypothesis

The effect that age of arrival has on ultimate attainment in second-language acquisition provides evidence for the **critical period hypothesis** (Lee & Kim, 2011). This is the idea that children have a biological predisposition to learn languages that they

lose around puberty (Amengual, 2011). Several arguments favor the critical period hypothesis. For example, critical periods are commonly observed in the development of a wide range of species for various learned behaviors. Moreover, the critical period hypothesis pertains not just to second-language acquisition but to language acquisition in general, since children who are deprived of language input in their first years, for example because of deafness, rarely fully recover when language input is provided later on.

Critical periods are generally accounted for in terms of **cerebral plasticity**, referring to *the brain's ability to modify its structure in response to new experiences*. During the critical period, the brain is plastic, and its structure can be reformed to process particular information more efficiently. For example, cerebral plasticity accounts for the bilingual advantage in executive control. After a certain period, the brain becomes less plastic, and learning is more difficult (Saito & Brajot, 2013). The critical period hypothesis asserts that cerebral plasticity for language learning is lost after puberty, especially where pronunciation is concerned (Hopp & Schmid, 2013). Hence, those who learn a language before puberty become native speakers, but those who learn after puberty speak with a foreign accent.

Puberty doesn't present a clean break between those who can and those who can't learn a second language. Rather, it's simply easier to learn before than after, and you have a better chance of achieving native speaker proficiency the earlier you start. This observation has led some researchers to reconceptualize the critical period as a **sensitive period**, referring to *the time early in life when language learning is more likely to be successful* (Barreña & Almgren, 2012). In this view, language-learning abilities gradually decrease as we get older, and there's nothing special about puberty other than it's about the time when language learning shifts from being relatively easy to relatively difficult. The idea of a sensitive period, as opposed to a critical period, also leaves open the possibility that the age of arrival effect may not be due to a loss of cerebral plasticity but rather to other factors, such as motivation to learn, attitude toward the second language or its speakers, and the degree to which learners identify themselves with either the heritage or target culture (DeKeyser, 2013).

Speech Learning Model

The critical period hypothesis emphasizes age of arrival as the most important factor in determining ultimate attainment in second-language acquisition. Some researchers, however, focus on the length of residence factor, making *the proposal that a foreign accent is the result of an imbalance between the amount of time spent using the first and second languages* (Saito & Brajot, 2013). According to the **speech learning model**, there are no maturational constraints on language learning. However, late bilinguals have far more lifetime experience using their first language, whose sound system has become entrenched and thus influences pronunciation in the second language, resulting in a foreign accent (Hopp & Schmid, 2013).

A number of observations provide support for the speech learning model. For example, immigrants who assimilate well into their new society and maintain relatively little contact with their heritage community often eventually develop pronunciation in the second language that is close to that of a native speaker (Saito & Brajot, 2013). In other words, as lifelong experience with active use of the second language increases, the influence of the first language decreases. Likewise, even early bilinguals may speak one of their languages with an accent, as is often the case in second- or third-generation immigrants who speak some of the heritage language but predominantly use the societal language in their daily lives (Mora & Nadeu, 2012). Researchers have also observed cases in which bilinguals develop a foreign accent in their first language after spending many years in the new country speaking the second language almost exclusively (de Leeuw, Mennen, & Scobbie, 2011).

A final observation that lends support to the speech learning model and provides evidence against the critical period hypothesis, at least in its strong form, is the fact that foreign accents are learnable (Mora & Nadeu, 2012). Actors routinely undergo phonetic training to learn convincing foreign or dialectal accents for the roles they play. Perhaps willingness or need to learn plays a role in ultimate attainment of second-language pronunciation. Another factor may be self-concept. It could be that bilinguals who still identify themselves as members of the heritage society maintain a foreign accent to signal that identity, while those who see themselves as assimilated members of the new society show their affiliation by achieving near native speaker pronunciation in the second language. Much more research is needed to tease out these internal variables.

Bilingual Home Environment

Parents wishing to raise their children bilingually take different approaches, depending on their circumstances. One type of bilingual home environment is known as the **one-parent-one-language approach**, which is *a strategy for raising bilingual children that has one parent speaking the heritage language and the other parent speaking the societal language* (Byers-Heinlein, 2013). This is commonly used in cases where each parent speaks a different native language. (Of course, they do have at least one language in common.) Let's take the example of a French woman married to an American man raising their children in the United States. The children speak French with their mother and English with their father; but because their English is also supported by the larger society, they run the risk of not fully developing as native French speakers without support outside the home (Cantone, 2013).

In the case of an immigrant couple raising their children in a new country, the **one-language-at-home-one-language-outside approach** is typical. This is *a strategy for raising bilingual children in which the heritage language is learned from family members and the societal language is learned at school* (Cantone, 2013). This approach is more likely to produce a balanced bilingual because the child gets heritage

language support from more than one adult. Furthermore, the child acquires a solid foundation in the heritage language before exposure to the societal language that will likely be dominant in his or her life.

Some parents use a mixed approach in which they speak both languages interchangeably at home. Recall that codeswitching is a normal part of bilingual talk-in-interaction, and children learn from a young age the pragmatic rules for when to use each language. Despite this apparently confusing situation, research shows that children raised in a bilingual home are able to separate the two languages from early on (Meisel, 2012). The real key to raising bilingual children is to make sure that both languages play important roles in their lives (Cantone, 2013). This is usually only possible if there is some sort of support for the heritage language outside the home or else a compelling reason to frequently speak it such as needing to communicate with family members that only speak the heritage language (Dixon et al., 2012.)

Raising bilingual children requires sustained effort over many years. If the heritage language isn't valued or supported in the larger community, bilingual children will favor the dominant language (Dixon et al., 2012.) This is especially true when the parents also speak the dominant language well and have shifted to using it at home. This may lead to incomplete first-language acquisition, in which case the child shifts from the heritage to the dominant language during the early stages of learning the first language (Cuza, 2012). There is also *the situation where a bilingual favors the second language to the extent that first-language ability is lost*, known as **first language attrition** (de Leeuw et al., 2011). In either case, these people are essentially monolingual, and the language they speak is not the first one they were exposed to. This is the normal course of language development for a child adopted from another country.

Bilingual Education

In the United States, over five million **English language learners** are enrolled in the public school system (Han, 2012). These are *children entering school whose native language is not English*, and they come from over 350 heritage language backgrounds, with the majority from Hispanic or Asian families. Since these children don't have sufficient language proficiency to succeed in an English-only classroom, some sort of bilingual instruction is in order.

Various forms of bilingual education are being implemented in the United States and other countries with sizeable immigrant or ethnic minority populations, but these programs can be classified into two main types (Leikin, 2012). A **transitional program** is *a form of bilingual education that is intended to assimilate heritage language students into the mainstream language and culture*. Consider as an example a school district with a sizable Hispanic population. In the first grade, English language learners may receive

Figure 9.12 Bilingual Education

Many schoolchildren in the United States speak a language other than Standard American English at home. Bilingual education is essential for helping these children reach their full potential.



Source: ©iStockphoto.com/CEFutcher.

90% of their instruction in Spanish and 10% in English. In each successive grade, the ratio of English- to Spanish-language instruction is increased until students reach a point where they can perform successfully in English-only classrooms. This transition generally takes five to seven years (García & Náñez, 2010).

The other approach is known as a **two-way immersion program**, which is a form of bilingual education that is intended to develop fully bilingual and biliterate students (Leikin, 2012). By necessity, two-way immersion starts out, like a transitional program, with the bulk of the instruction in the heritage language; but instead of a transition to full English instruction, the end state is a fifty-fifty split between subjects taught in the heritage and societal languages.

Both approaches develop students who are socially and academically proficient in English (García & Náñez, 2010). However, students in transitional programs run the risk of first-language attrition (Han, 2012). As a result, these students feel less solidarity with their families and ethnic communities, leading to lower self-esteem, poorer academic performance, and higher incidence of behavioral problems (Han &

Huang, 2010). On the other hand, students in two-way immersion programs maintain their heritage language and thus enjoy closer relationships with their families and ethnic communities, which leads to higher self-esteem and fewer behavioral problems. Furthermore, by high school they outperform their monolingual English peers in all academic subjects.

The End Game

Let's wrap up this section on second-language acquisition with a consideration of what it means to be bilingual. It's important to understand that a bilingual is not a double monolingual (Hopp & Schmid, 2013). That is, the two languages are not separate but rather overlap and interact with each other (de Leeuw et al., 2011). Since all languages share a core set of features, much of what is learned in the first language will transfer to the second language. For example, we only need to learn how to read once, since the basic skills will automatically transfer to a newly learned language (Rauch, Naumann, & Jude, 2011). Where there are differences between the two languages, there is bound to be interference, mainly from the dominant to weaker language, but still going in both directions (García & Náñez, 2010). Thus, bilinguals can't be expected to perform like monolinguals in either of the languages they speak.

We also need to revisit the received wisdom that children are better language learners than adults. We've seen that children are more likely to acquire a second language without a foreign accent, and they may also do better on subtle aspects of grammar. However, adults also have advantages when it comes to learning a second language. Studies of immigrant families show that, at least in the early stages of language acquisition, the parents outperform the children (DeKeyser, 2013). The difference is that the adults tend to plateau before full mastery while the children go on to become native speakers. Adults also have an advantage when it comes to learning vocabulary (Barreña & Almgren, 2012). No doubt this is because the learning mechanisms for vocabulary are different from those for learning pronunciation and grammar. After all, we learn the phonology and syntax of our native language within a few years, but we continue to learn new words for our entire life. The same is true for a second language as well.

In Sum

Before puberty, age of arrival and length of residence are the best predictors of ultimate attainment in a second language. After puberty, internal factors such as aptitude, attitude, motivation, and self-concept have more influence on ultimate attainment. The critical period hypothesis explains age of arrival effects in terms of early cerebral plasticity. That is, young brains are receptive to new languages and readily adapt to them, but after puberty cerebral plasticity is reduced, making it more difficult to learn a new language. The speech learning model focuses instead on the amount of time spent using each language. Since most late bilinguals

continue using their first language throughout their lives, it inevitably impacts the second language. However, when learners assimilate to the new culture, they may speak the second language with near native speaker pronunciation. In such cases, they may lose their first language altogether. Bilingual education programs take one of two approaches. Transitional programs attempt to assimilate heritage language students into the new culture, while two-way immersion programs strive to produce balanced bilingual speakers and readers. Although children are better than adults at acquiring the finer points of pronunciation and grammar, adults are better at learning vocabulary. In the end, native speaker pronunciation may not be the best way to evaluate ultimate attainment in a second language. Rather, we need to consider overall how effective individuals are in the second language at meeting their communication needs.

Review Questions

1. Explain the concepts of ultimate attainment, age of arrival, and length of residence. Discuss how well age of arrival and length of residence predict ultimate attainment before and after puberty.
2. Compare and contrast the critical period hypothesis and the speech learning model in terms of how they account for ultimate attainment. Which variable (age of arrival or length of residence) does each approach emphasize? Explain.
3. Describe the different bilingual home environments. What are the circumstances that determine which approach parents are likely to take? What are the advantages and disadvantages of each approach?
4. Describe the phenomena of incomplete first-language acquisition and first-language attrition. Under what circumstances might these occur?
5. Describe the two approaches to bilingual education. What is the goal of each approach? Which approach is generally considered more successful? Why?

Thought Questions

1. Many students in the United States study a foreign language, but few become competent speakers. If you were designing a foreign language program for a high school or university, what sorts of programs would you want to implement to help your students become successful language learners? Explain your rationale in terms of what you've read in this section.
2. Imagine you are an administrator of a school district with a sizable immigrant population. What factors would you need to take into

consideration as you developed a plan for implementing a bilingual education program?

Google It! Foreign Accent Training

If you're interested in how actors learn foreign and dialectal accents, search YouTube for videos on **foreign accent training**. For a humorous take on the subject, google **Indianapolis Academy of the French Accent**.

CONCLUSION

A *New Yorker* cartoon by noted artist Victoria Roberts shows a middle-aged couple sitting in their living room. Out of the blue, the wife declares: "I'm not wasting this year. I'm learning Catalan." While resolving to spend the year learning a new language may be a noble idea, this learner is unlikely to be successful unless she immerses herself in the society that speaks the language and uses it on a daily basis. For most adults occupied with their work-a-day lives, learning a new language just for the fun of it simply isn't an option.

Few of us have the luxury of choosing which language to learn. As children, we have one or more languages foisted upon us, learning to speak whatever is spoken around us. As adults, we might find ourselves in a position where we need to learn a new language, for example if we study abroad or immigrate to a new country.

Learning a language takes time and effort—a whole lot of both, in fact. So adults, in their busy lives, only learn as much of a second language as they need to get on with their lives, whether that be haggling in the marketplace, chatting with passengers in their taxicab, or attending college in another country. In short, bilingualism isn't a choice but a necessity, and for most people on the planet it's a way of life.

CROSS-CULTURAL PERSPECTIVE: You Are What You Speak

Your personality is unique to you. It's the set of traits and characteristics that make you different from other people. It's also what's consistent about you from one situation to another. So it's only reasonable to assume that your personality would stay the same no matter what language you speak. But that's not what personality researchers have found.

Although there are many theories of personality, the most commonly used model in personality research nowadays is the Big Five model, originally proposed by McCrae

and Costa (1990). As the name implies, the model describes personality in terms of five core traits:

- How *open* or imaginative you are
- How *conscientious* or self-disciplined you are
- How *extraverted* or outgoing you are
- How *agreeable* or trusting and helpful you are
- How *neurotic* or emotional you are

These five traits are considered universal, but different cultures value or emphasize different traits. For example, when researchers administered personality tests to Americans who spoke only English and to Mexicans who spoke only Spanish, they found the Americans to be more conscientious, extraverted, and agreeable than the Mexicans on average (Ramírez-Esparza et al., 2006). This finding suggests that people tend to shape their personalities to fit cultural norms or stereotypes.

The researchers then asked Spanish-English bilinguals living in Texas to take the personality test twice, once in each language. When they took the test in English, their scores were similar to those of the American monolinguals, and when they took it again in Spanish, their scores were more like those of the Mexican monolinguals. In other words, the bilinguals' personalities changed somewhat depending on the language they were tested in. The researchers interpreted these findings in terms of cultural frame shifting, analogous to codeswitching between languages.

These results have been replicated a number of times, even with bilinguals who had learned their second language as adults. In one study, researchers administered personality tests to German-Spanish bilinguals (Veltkamp et al., 2012). Regardless of which was their first language, they all tended to have different traits when tested in Spanish than when tested in German. In particular, both groups were more extraverted and neurotic in Spanish and more agreeable in German. These findings provide additional support for the idea of cultural frame shifting as bilinguals switch from one language to another.

Similar results were also found among Chinese-English bilinguals living in Hong Kong (Chen & Bond, 2010). As expected, these bilinguals reported personality traits closer to Chinese cultural norms when tested in Chinese and more like American norms when tested in English. Furthermore, the ethnicity of the interviewer (Chinese or American) also had an influence, as these bilinguals yielded personality scores tending toward the cultural norms of the person they were talking to.

Language and culture are inextricably linked, and when a person speaks a particular language, the norms and stereotypes of that culture are brought to mind as well. Studies like these show us that our personalities are not as stable as we'd like to think. Rather, we modify our behavior, and even our thought processes, depending on the group we're currently associated with. Thus, when bilinguals switch from one language to another, they shift their personalities as well.

KEY TERMS

Adaptive control hypothesis	Flanker task	Receptive bilingualism
Age of arrival	Heritage language	Revised hierarchical model
Balanced bilingual	Incomplete first-language acquisition	Selective attention
Bilingual	Interference hypothesis	Semantic categorization task
Bilingual accommodation	Interference inhibition	Sense model
Bilingual disadvantage	Interlingual homographs	Sensitive period
Cerebral plasticity	Language negotiation	Simon task
Codeswitching	Length of residence	Societal language
Cognates	Lingua franca	Speech learning model
Cognitive reserve	Mental flexibility	Transitional program
Critical period hypothesis	Metalinguistic awareness	Translation equivalents
Cross-language priming	Monolingual	Two-way immersion program
Dominant language	Mutual intelligibility	Ultimate attainment
Dorsolateral prefrontal cortex	One-language-at-home–one-language-outside approach	Unbalanced bilingual
English language learners	One-parent–one-language approach	Weaker links hypothesis
Executive control		
First-language attrition		