

Reading 2

Nicoladis, E., (2008). Bilingualism and Language Cognitive Development. In J. Altarriba & R.R. Heredia (eds.) *An Introduction to Bilingualism: Principles and Processes*. London: Lawrence Erlbaum Associates

Chapter 8

Bilingualism and Language Cognitive Development

Elena Nicoladis

University of Alberta

Child: *Mon ventre est presque full de water!*
“My belly is almost” full “of” water!

My daughter, a French-English bilingual, said the above sentence when she was five years old. To someone familiar only with monolingual conversations, this sentence might sound as if she were arbitrarily using words from her two languages, making a kind of language salad. When parents of bilingual children hear mixed-language sentences, they sometimes worry that learning two languages confuses their children. Does bilingualism confuse children?

One of the earliest studies of a bilingual child's language development showed that bilingualism did not confuse the child. Ronjat (1913) kept a diary of the words and sentences used by his son, Louis, who was being raised speaking both French and German. Ronjat himself spoke only French to Louis while Louis's mother spoke only German. By the time Louis was 16 months old, he chose the appropriate language for his parents, saying *brot* (*bread* in German) to his mother and *pain* (*bread* in French) to his father. At the age of 28 months, Louis addressed the French cook in German, but he quickly learned to use the correct language. Louis learned German faster than he did French and, until he was about 43 months of age, he occasionally borrowed a German word when he was trying to speak French. Almost all of his language mixes could be attributed to a gap in Louis's French vocabulary. Ronjat attributed Louis's lack of confusion to the fact that both he and his wife always addressed Louis in their native tongue and did not themselves mix languages. He concluded that bilingualism did not have to lead to confusion.

This conclusion was questioned by the results of another diary study of a German-English bilingual child who grew up in the United States. Leopold (1949) spoke only German to his daughter, Hildegard, and his wife spoke only English. Hildegard produced mixed-language utterances. Leopold concluded that Hildegard passed through a stage of assuming that German and English were a single linguistic system. Hildegard did not differentiate her two languages until she was about three years of age.

On the basis of these two diary studies, it is impossible to draw any general conclusions about whether bilingualism confuses children. Not only do we have the results for only two children, but also there is a methodological difficulty with diary studies. In both cases, the diarist could only observe his child's behavior when he was present. The presence of one parent could affect the behavior of the child (Genesee, 1989). For example, in Hildegard Leopold's case, it is possible that she spoke as much German as possible when her father was present and never spoke it when he was absent. A diary study cannot tell us about behavior when the diarist is absent.

More recent research has corrected for this possibility by videotaping children in spontaneous conversation with a variety of people who speak different languages (Genesee, Nicoladis, & Paradis, 1995). For example, in a study of a Portuguese-English bilingual child growing up in the United States, the researchers videotaped the child playing in his home in two different contexts: (a) with the Portuguese-speaking father, videotaped by a native Portuguese speaker, and (b) with the English-speaking mother, videotaped by a native English speaker (Nicoladis & Secco, 2000). Results of studies like these show that bilingual children can reliably choose the language preferred by their interlocutor from at least two years of age (e.g., Nicoladis & Genesee, 1996).

In fact, by the age of two years, bilingual children even show sensitivity to a stranger's language choice. Genesee, Boivin, and Nicoladis (1996) observed four French-English bilingual two-year-olds growing up in Canada. All four children were learning French from one parent and English from another, although all the parents had some knowledge of the other language. The researchers first videotaped each child interacting with each of her parents in spontaneous play situations. Then, on the basis of parental reports and each child's production on the videotape, the researchers identified each child's weaker language (for two children it was French, and for the other two it was English). The researchers then asked a stranger who spoke only the child's weaker utterance to play with the child while being videotaped. Three of the four children spoke significantly more of the stranger's language with the stranger than with the relevant parent. These results suggest that the bilingual children were sensitive to the stranger's monolingualism and used as much of that language as they could.

Young bilingual children might also be sensitive to how their parents respond to their language mixing. Lanza (1992) observed a Norwegian-English bilingual girl, Siri, growing up in Norway with her Norwegian-speaking father and English-speaking mother. The father seemed to be more accepting of the child's language mixing; when Siri mixed languages, the father allowed the conversation to continue. For example, when Siri used the English word *hug* with him, he responded mostly in Norwegian, including the English word *hug*. In contrast, Siri's mother responded to mixed languages as if she did not understand the Norwegian words. Lanza argued that Siri was more likely to mix languages with her father because she learned that he accepted either language.

Taken together, these studies suggest that bilingualism does not confuse children. The language mixing that Leopold thought was evidence for confusion is actually a clever use of linguistic resources on the part of bilingual children. Bilingual children can clearly differentiate their languages from at least two years of age and can negotiate the appropriate language of a conversation. While bilingual children can differentiate their languages, they do not use their languages exactly

like two monolinguals (Grosjean, 2001). Why does bilingualism affect language and cognitive development? Clearly, the answer is at least somewhat implicit in the question—bilingual children know two languages and monolinguals know one. What is it about the knowledge of two languages that makes development different? In this chapter, I will discuss four ways in which researchers have documented differences between bilinguals and monolinguals: delay in language development, acceleration in language development, cross-linguistic transfer, and cognitive differences. At the outset, I would like to note that the differences between bilinguals and monolinguals are often small (see de Houwer, 2005). Nevertheless, the detectable differences can shed some light on how language and cognitive development unfold in all children.

Before turning to a review of the observed differences, it is important to note how bilingualism is characterized. I will concentrate on bilingual development in the first five years of life. Most of the studies have concerned simultaneous bilinguals (that is, children acquiring two languages from birth). Because it is possible that there will be differences in development if two languages are acquired sequentially (de Houwer, 1995), I will note if a study concerns sequential bilingual development. I will also concentrate on children who have been exposed to two languages on a regular basis. This characterization of bilingualism allows for the possibility of passive knowledge of one language. Because I am using such a liberal characterization of bilingualism, it is important to note, where possible, how variations in children's proficiency or degree of knowledge of the two languages affect our conclusions about where and why there are differences in development due to bilingualism.

Delay in Language Development

Does bilingualism delay language development? To answer this question reliably, it is important to compare a group of typically developing bilingual children with a group of typically developing monolingual children. However, it is difficult to find an appropriate group of bilinguals because bilinguals form a heterogeneous group. The heterogeneity comes from a variety of sources. Bilingual children are often more proficient in one language than another, with their proficiency varying considerably between individuals and over time. For example, Leopold (1949) reported that his daughter's German was weaker than her English until they went on a trip to Germany for several weeks. Variations in bilingual development might also be manifested in terms of the language pairs known (e.g., Chinese and English vs. Vietnamese and French). The attitudes toward bilingualism that parents and people in the general public have could also influence how well children end up speaking their two languages.

The heterogeneity of bilinguals is a challenge to devising norms for bilingual development. Nevertheless, researchers have been interested in what domains of language bilingualism might slow down. Before turning to the research results, I would like to caution the reader that few bilingual children have been studied in each of the domains I will mention.

In some domains of language development, bilingual children seem to show no delays. One of the earliest developmental markers of language behavior is the onset of canonical babbling, or babbling composed of consonant-vowel-consonant-vowel forms such as *dada*. Some researchers have argued that canonical babbling allows children to practice word-like forms before actually saying words (Vihman, 1996). One study recorded the babbling produced by infants who heard both Spanish and English on a regular basis (Oller, Eilers, Urbano, & Cobo-Lewis, 1997). This study showed that the age at which the bilingual infants started to use canonical babbling was the same age as has been reported for monolingual infants.

There is evidence of delays in language acquisition in other domains. I will mention two here: vocabulary size and production of past tense verbs.

Several researchers have reported that preschool bilingual children's vocabulary scores are often lower than monolingual children in either language (e.g., Pearson, Fernández, & Oller, 1993). Pearson et al. (1993) asked the parents of 25 Spanish-English bilingual children between 8 and 30 months of age to fill out vocabulary checklists of words that their children used spontaneously. They found that the average vocabulary score was about half that of a monolingual in each language (Pearson et al., 1993). However the total vocabulary size of bilingual children was approximately equivalent to the vocabulary scores reported by parents of monolingual children. In a follow-up study, the researchers compared the ratio of vocabulary between the two languages of an individual child with the time the parents reported that the child spent interacting in each language (Pearson, Fernández, Lewedag, & Oller, 1997). They found that the more time the children spent interacting in a language, the greater their vocabulary in that language. These results suggest that there may be some limits on children's vocabulary size in the first few years of life and that the frequency of exposure to a language will be related to which words a child learns.

It is possible that the limits on vocabulary size are limited to the first few years of life. Adult bilinguals can score as high as monolinguals on vocabulary tests in both languages (Eilers, Pearson, & Cobo-Lewis, under review). While no systematic analyses have addressed this issue with older children, there is some evidence pointing to the possibility that three- and four-year-old bilinguals might score higher on average than half the vocabulary of monolinguals (see Nicoladis, 2003). It is possible, then, that the delay in vocabulary acquisition in bilinguals in a language is a short-lived phenomenon, restricted to the first few years of language acquisition. I will return to this point later, when I talk about cognitive differences between bilinguals and monolinguals.

Another example of delay in language acquisition to be discussed here is in the acquisition of past tense verbs. One study reported such a delay in French-English bilingual children between the ages of 4 and 6 years (Nicoladis, Palmer, & Marentette, 2007). The researchers showed a cartoon to a group of bilingual children, a group of English monolingual children, and a group of French monolingual children. They asked the children to tell the story back to someone who had not seen the cartoon. The bilingual children told the story twice, once to a French speaker and once to an English speaker. The researchers found that the bilingual children used fewer correct past tense forms to tell a story than monolinguals in both languages. The differences were particularly noticeable with irregular past tense forms; the bilingual children made more errors by adding *-ed* to irregular verbs, like *goed* or *runned*. Because irregular past tense verbs are irregular, there is no way to learn them except by hearing them repeatedly (e.g., Bybee, 1995). Monolinguals also make the same kinds of errors, but they do so earlier in development. Thus, the researchers concluded that the bilingualism delayed the children's acquisition of past tense verbs. This delay could be due to the fact that they hear less of each language than monolinguals and practice using verbs less often as well.

In sum, I have mentioned here two domains in which delay in language acquisition has been observed in bilingual children: vocabulary size and past-tense verb forms (particularly irregulars). In these domains, the frequency of exposure to and use of a particular language is thought to play a crucial role in acquisition.

While delays might be attributed to frequency, it does not necessarily follow that no delay means that frequency is not an important variable in the acquisition of that particular aspect of language. The domains in which no delay has been reported are domains in which exposure to *any* language may be crucial. For example, as long as a child is hearing language on a regular basis, he/she will produce his/her first word around 13 months of age (e.g., Doyle, Champagne, &

Segalowitz, 1978; see Capute et al., 1986, for monolingual norms). There is no reason to suspect that bilingual children will be delayed in all domains of language development.

Acceleration in Language Development

I know of only one report of bilingualism being associated with acceleration in language development. Note that the fact that acceleration has been mentioned in the literature less often than delay cannot, at this point, necessarily be taken to mean that bilingualism delays development more often than it accelerates it. As mentioned in the last section, it is difficult to compare a few bilingual children's development with norms for monolinguals.

The report of accelerated development comes from a study in which children were asked to name some machines that were performing an action on an object (Nicoladis, 2003). For example, one machine was catching butterflies. In English, the children were encouraged to produce compound words like *butterfly catcher* (object-verb-er) and in French, *chasse-papillons*, (literal translation: *chase-butterflies*). Compounds of the form verb-object are grammatical in French (e.g., *casse-noisettes* or *break-hazelnuts* refers to a *nutcracker*), although there are few examples of them in the language. The preschool French-English bilingual children produced more compound words in French than monolingual children, once the vocabulary scores were statistically controlled for. How could the bilingual children's knowledge of English help them produce more verb-object compounds in French? To understand these results, it is important to know that monolingual English-speaking children produce ungrammatical verb-object compounds around the age of four years when an object-verb-er compound would be expected (Clark, Hecht, & Mulford, 1986). For example, they might say *a wash-bottle* to refer to someone who washes bottles, while adults are more likely to say *a bottle washer*. Nicoladis argued that the French-English bilingual children produced more verb-object compounds in French than monolinguals because they had access to verb-object compounds in English as well (for whatever reason monolingual English-speaking children use them).

Bilingual children may use whatever knowledge they have, even if it comes from the inappropriate language for the context. Gawlitzek-Maiwald and Tracy (1996) explored this issue using data from a German-English bilingual girl whose German was more proficient than her English. They recorded the child in spontaneous conversation with a variety of speakers. They showed that soon after the child started using auxiliary verbs in German, she also started to use these German auxiliary verbs in her otherwise mostly English utterances. For example, she said *ich hab gemade you much better* (*I have ge-made you much better*). Note that the morpheme *ge-* in German can mark a verb as being in the past tense. By using auxiliary verbs in German, this girl could clearly refer to events in the past in English, at a point in time when she could not do so in English alone. The researchers argued that the child's use of two languages allowed her to create utterances of a greater complexity than her English knowledge alone would allow her to do. They refer to this phenomenon as bilingual bootstrapping.

If the interpretation of these studies is correct, then knowledge of the underlying structure in one language (even if it is ungrammatical, as with the verb-object compounds) can bootstrap bilingual children into producing a similar structure in their other language. This production can happen earlier than one might expect, given the children's proficiency. If the two languages share a structure, then bilingual children might be more advanced in development than monolingual children at a similar stage of linguistic development. What happens when two languages differ in structure?

Cross-Linguistic Transfer

Bilingual children sometimes use constructions in one language that seem to be based on a structure from the other language. For example, a Spanish-English bilingual child might talk about *the shoe of my father*, rather than the more usual *my father's shoe*, based on the Spanish construction *el zapato de mi papá*. I use the terms cross-linguistic transfer (or transfer) to refer to the structural influence of one language on another. The resulting construction in the previous example is grammatical in English, although the result of cross-linguistic transfer could be an ungrammatical construction. For example, one Italian-German bilingual child growing up in Italy said *Von Lisa klein klein* (*from Lisa little little*; Volterra & Taeschner, 1978). Most adjectives in Italian typically appear after nouns while adjectives in German typically appear before nouns. The child may have been using the Italian word order in German. Another example comes from a Cantonese-English bilingual child who said *Where's the Santa Claus give me the gun?* meaning to refer to the gun that Santa Claus had given him (Yip & Matthews, 2000). The researchers argue that the child was using a word order allowed in Cantonese.

Cross-linguistic transfer has not just been observed in word order. For example, Holm and Dodd (1999) described the pronunciation of particular consonants in Cantonese by two children who started learning English after their second year. Both children were living in Australia and were the children of immigrants from Hong Kong. The researchers made regular recordings of the children's pronunciation of words in conversation for about six months. The children initially pronounced their Chinese words with Chinese sounds. After a few months of exposure to English, however, they started to use some English-sounding consonants in their pronunciation of Cantonese words.

Researchers have been exploring several explanations of cross-linguistic transfer. I will briefly mention two here: (a) idiosyncratic input, and (b) speech production. Note that these explanations are not necessarily mutually exclusive. It is possible that transfer is a complex phenomenon with many sources.

Idiosyncratic input could account for some cases of cross-linguistic transfer. In one study, researchers focused on the spontaneous productions of a Spanish-English bilingual child who was growing up in Great Britain (Paradis & Navarro, 2003). In Spanish, it is possible to produce a grammatical sentence without specifically mentioning the subject of the sentence. For example, it is possible to say *Yo como la manzana* (literal translation: *I eat the apple*) and *Como la manzana* (literal translation: *eat the apple*). The researchers were interested if the bilingual child would produce more subjects of sentences in her Spanish sentences because they are required to make grammatical sentences in English. They found that the child did, in fact, produce more subjects in Spanish than two monolingual Spanish-speaking children of the same age. Before concluding that the child's idiosyncratic Spanish was due to knowledge of English, the researchers calculated how often the parents produced subjects of sentences. They discovered that both parents of the bilingual child also produced more subjects than did the mothers of the monolingual children. The researchers could not rule out the possibility that the child was learning an idiosyncratic version of Spanish (at least initially).

Another possible explanation of cross-linguistic transfer is that it appears in the normal process of putting words to ideas in the act of producing speech (Nicoladis, 2006). Nicoladis came to this explanation on the basis of data from French-English bilingual children. She showed preschool children pictures of objects and encouraged them to label the objects with adjective-noun constructions (like *a sad dog* or *a striped dinosaur*). The bilingual children did two sessions, one in English with a native English speaker and one in French (on a different day) with a native French

speaker. In English, adjectives almost always appear before nouns and in French, most adjectives appear after nouns (e.g., *carte blanche*: Literal translation, *card white*) although some adjectives appear before nouns (like *grand*: Translation, *big* and *nouveau*: Translation, *new*). Before discussing the results that pointed to evidence for cross-linguistic transfer, it is important to note that most of what the bilingual children said was grammatical for the target language. The bilingual children reversed more adjectives in English (e.g., *a dog sad*) than monolingual children. The bilingual children also reversed more adjectives in French than monolingual children (e.g., *un rayé elephant*: Translation, *a striped elephant*; this adjective would typically appear after the noun). Finally, the bilingual children reversed more adjectives in French than in English.

Nicoladis (2006) argued that the cross-linguistic transfer observed the previous study and in other studies of bilingual children comes from how speakers put words to the concepts they wish to convey. Previous studies of monolinguals have shown that speech errors are likely to occur when speakers have to choose between two linguistic structures conveying the same message (Ferreira & Dell, 2000). For example, a person who uses both the words *sofa* and *Chesterfield* might occasionally say *chofa*. Nicoladis (2006) argued that cross-linguistic transfer can be seen as a kind of speech error. Any time bilinguals have to choose between linguistic structures (either within a language or between languages), they are more likely to make speech errors. According to this interpretation, the reason bilingual children make more errors in French than in English with adjective placement is because there are two options of where to place adjectives in French.

In sum, while much of what bilingual children say is grammatical in the target language, it is clear that they produce some constructions that are influenced by knowledge of their other language. Several factors might contribute to children's likelihood to display cross-linguistic transfer, including idiosyncratic input (for other possible factors, see Müller & Hulk, 2001). It is also possible that cross-linguistic transfer is due, at least in part, to children having to choose between a variety of different ways of conveying a message. If this is true, then, the cross-linguistic transfer observed in bilingual children may not be all that different from the kinds of speech errors observed in monolingual children.

Cognitive Differences

Several researchers have argued that bilingual children's cognitive development would benefit from knowing two languages and having a contrast in two linguistic systems. The contrast would facilitate bilingual children's insight into the separability of words from their referents. Since the 1960s and 1970s, researchers have documented cognitive differences between bilinguals and monolinguals, with a bilingual advantage in cognitive flexibility (e.g., Ben-Zeev, 1977), intelligence and creativity (Peal & Lambert, 1962). These researchers argued that experience with choosing languages permitted bilinguals to create less strong connections between words and referents. More recently, researchers have narrowed in on a few ways in which bilinguals think differently from monolinguals. In this section, I will discuss four ways: communicative competence, theory of mind, strategy use, and control of attention.

Communicative competence refers to the ability to communicate effectively, taking into account the interlocutor's knowledge and conversational needs. Bilingual children have extensive experience of choosing languages for the pragmatic context, such as a particular person or a topic. As a result of their experience choosing different languages, they might become sensitive to other people's communicative needs. For example, consider the results of one study with two-year-old French-English bilingual children growing up in Montreal (Comeau, Genesee, & Lapaquette,

2003). In this study, the researchers visited the children three times and on each visit calibrated the rate of language mixing that they used in speaking to the children. On the first visit, the rate of mixing was low, on the second visit it was higher and on the third visit it was low again. The children's rate of language mixing mirrored that of the researchers. This result suggests that bilingual children can modify their rate of mixing to correspond to that of their interlocutor. Another example of communicative competence comes from a study of two Estonian-English bilingual siblings who were raised in the United States (Vihman, 1998). They were recorded in free play situations over the course of about four years, starting when the older sister was almost six and the younger brother was about two-and-a-half years old. Vihman noticed that the children used English (the language of school and outside the home) for dramatic play and Estonian (the language of the home and the children's stronger language) to negotiate the rules of play. Thus, the children seemed to associate each language with a function.

The results of the previous studies suggest that bilingual children can make on-line adjustments of their language choice, depending on what language is spoken to them. Are they simply reacting to the language spoken to them at that moment? Or do they know something about how much linguistic knowledge they share with their interlocutor? One way to assess the source of bilingual children's communicative competence is to see if children are sensitive to an interlocutor's linguistic knowledge and see how they behave with languages they do not speak. The results of one study could suggest that bilinguals might be more sensitive than monolinguals to an interlocutor's knowledge when the interlocutor speaks a language that the children do not. Nicoladis, Kwong See, and Rhemtulla (2005) compared English monolinguals and French-English bilinguals on whether or not they understood that they did not understand what a Chinese speaker meant. The study was based on research showing that children tend to assume that novel words refer to objects for which they do not know a name (e.g., Markman, Wasow, & Hansen, 2003). Nicoladis and her colleagues asked two- and three-year-old children to indicate whether a novel word that was used by a speaker who only spoke in Chinese referred to an object for which they already knew a name (like an *apple*) or an unfamiliar object (like a *Zimmer frame*). If children understood that Chinese words could refer to objects for which they already had a name in English, they should pick randomly between familiar and unfamiliar objects. In fact, this is what the bilingual children did. In contrast, the monolingual children were less likely to pick familiar objects, suggesting that they treated Chinese words much like novel English words. Other studies with older bilingual children have not necessarily shown the same pattern of results (e.g., Davidson, Jergovic, Inami, & Theodos, 1997). However, Nicoladis et al. (2005) pointed out that the interlocutors sometimes switched languages in that study, so the bilingual children could have been allowing the possibility of a language switch. The results of the study with younger children suggest that bilingual children may be sensitive to their interlocutor's linguistic knowledge.

To see to what extent bilingualism leads to sensitivity to other people's knowledge, researchers have tested the hypothesis that bilingual children have an advantage over monolinguals in the development of theory of mind. Theory of mind refers to the ability to think about others' thoughts, especially the ability to know that others can have different thoughts from oneself (Bartsch & Wellman, 1995). Because bilingual children have the experience of changing languages according to the interlocutor, they might develop an early understanding that other people's thoughts can differ from their own. One task used to assess children's theory of mind is a false belief task (Perner, Leekam, & Wimmer, 1987). For example, children might be shown a Smarties box and asked what is inside. They usually say that there are Smarties inside. The researcher then opens up the box to reveal something else, like pencils. The children are then asked to predict what another person who was not present for the opening of the Smarties box will say is in the box. Three-year-old

children often say *pencils* while four-year-old children are more likely to say *Smarties* (Perner et al., 1987). Researchers have interpreted these findings to mean that three-year-old children assume that everyone shares the same knowledge as they themselves have while four-year-olds are capable of considering the possibility that someone could have different beliefs and that these beliefs could be false. Goetz (2003) showed that Mandarin-English bilingual children were more likely to pass a false belief task than English monolingual children. It should be noted that other studies have shown no bilingual advantage in theory of mind tasks (e.g., Jean-Louis, 1999) or an advantage only after vocabulary had been controlled (e.g., Bialystok & Senman, 2004). Nevertheless, the bulk of the results point to the possibility that bilingualism leads to increased sensitivity to the knowledge of other people.

Another area of cognitive development that bilingualism might affect is the use of implicit strategies in communicating. Previous research with bilingual adults has shown that bilinguals learn words after fewer exposures than monolinguals (Gollan & Silverberg, 2001). Recall the point that was raised earlier in this chapter that preschool bilingual children sometimes have lower vocabularies than monolinguals in any one language (e.g., Pearson et al., 1993). At what point in development do strategies for rapid word learning develop? A possible partial answer to this question has emerged in a study of four- to six-year-old bilinguals (Nicoladis, Pika & Marentette, 2005). This study showed that when French-English bilingual children watched a Pink Panther cartoon and told back the story, they used more manual gestures while speaking than either English or French monolingual children (who used gestures at about the same rate). The researchers interpreted this result as suggesting that bilinguals gesture more to help access their words more efficiently. In fact, they found that the bilinguals used just as many words to tell their stories as monolinguals in both languages. This result is surprising if bilingual children's vocabulary size is smaller in either language than that of monolingual children.

Why might gesturing help children access words? Previous studies have shown that both adults' (e.g., Frick-Horbury & Guttentag, 1998) and children's (e.g., Alibali, Kita, & Young, 2000) use of gestures aided in accessing spoken language, particularly when people were asked to do a difficult task. It is therefore plausible that bilinguals use gestures to help access their spoken language efficiently. There are two other pieces of evidence converging on that same conclusion. First, bilingual children younger than four years of age have been shown to use some kinds of gestures when uttering particularly long utterances (Nicoladis, Mayberry, & Genesee, 1999; Nicoladis, 2002). Second, bilingual adults also gesture more than monolinguals, even when speaking their first language (Pika, Nicoladis, & Marentette, 2006). Taken together, these results suggest that bilinguals generally use manual gestures more than monolinguals, starting in the preschool years. The results to date are compatible with the idea that bilinguals use gestures more in order to aid their own access of spoken language. Bilinguals might use gestures to help reduce the competition between the two languages when they produce speech.

One possible outcome of bilingual children's experience with choosing the appropriate language for a particular person or context is enhanced selective attention to the relevant variables, particularly for formal linguistic tasks (Bialystok, 2001). For example, Bialystok (2001) reviewed a number of studies showing that bilingual children can perform better on grammaticality judgments of sentences that are also semantically anomalous (e.g., *Colourless green ideas sleep furiously*). In order to judge a semantically anomalous sentence as grammatical or ungrammatical, it is necessary to attend selectively to the syntax and ignore the meaning. These results have been replicated by other researchers (e.g., Cromdal, 1999). It is not clear that the bilingual advantage extends to all aspects of formal linguistic knowledge at all ages (e.g., Bialystok, Majumder, & Martin, 2003).

Nevertheless, the experience of choosing the appropriate language(s) for the context may give bilinguals some cognitive benefits over monolinguals.

In sum, bilingual children may have some differences from monolinguals in cognitive development in terms of communicative competence, theory of mind, gesture use and selective attention. In this section, I have addressed these four components of cognition as if they were separate. It is clearly possible that all four are manifestations of a single underlying cognitive process. Alternatively, it is quite likely that all four are minimally interrelated. For example, it could be the experience of choosing languages for a context that allows the bilingual advantages in taking other people's perspective (thus, enhanced theory of mind). This enhanced theory of mind might allow children's control of attention to relevant formal linguistic properties. It would be interesting to know how these aspects of cognitive development are related in both bilinguals and monolinguals.

Summary and Conclusion

The purpose of this chapter was to offer some answers to the question of why or how bilingualism affects language and cognitive development. As I noted at the beginning of the chapter, it is not surprising to find that the answer is at least partially definitional: bilingual children know two languages and monolinguals know one. What is it about the knowledge of two languages that makes development different? I reviewed four areas in which differences between bilinguals and monolinguals have been documented: delay in language development, acceleration in language development, cross-linguistic transfer, and cognitive differences. There are small but detectable differences between bilinguals and monolinguals in these areas. These differences can shed some light onto how language and cognitive development unfold in all children. I will review each of the major differences in turn, in hopes of highlighting what the differences might tell us about language and cognitive development in general.

There is some evidence of bilinguals acquiring some aspects of language more slowly than monolinguals. Recall, however, that bilinguals do not seem to be delayed in all aspects of language. The delays observed thus far are often with aspects of language that are thought to be highly dependent on frequency. And bilingual children hear and use less of either language than monolingual children. For example, bilingual children's delay in learning irregular past tense forms (Nicoladis et al., 2007) should come as no surprise. There is no other way to learn a truly irregular past tense except by memorization (e.g., Bybee, 1995). Bilinguals' less frequent experience with either language should cause delays in the aspects of language in which frequency is crucial for acquisition. Some language theorists have argued that much of language is learned on the basis of children's own usage (e.g., Tomasello, 2000). Bilingual acquisition allows an interesting testing ground for such theories.

Language acquisition is not based on frequency of usage alone. At some point in development, children must make generalizations about the patterns of linguistic combinations that can exist in their languages. In this chapter, I argued that when bilinguals have two similar underlying structures in their two languages, they can be accelerated in their usage of that structure relative to what we might expect from their level of proficiency (see Nicoladis, 2003). If bilinguals have two different underlying structures available, then there may be some cross-linguistic transfer, at least when they produce speech. If this interpretation is correct, then bilingual children's generalizations about possible structures in their two languages are not completely distinct by language (see discussion in Paradis & Genesee, 1996). If true, then children's generalizations about underlying

structures may go beyond what they have heard or used themselves. To some extent at least, children's underlying linguistic knowledge might not be linked to knowledge of a specific language.

Cross-linguistic transfer is due to different underlying structures in the children's two languages. Bilingual children must learn to process language-specific structures. When there are differences between the two languages' structures, children might have to choose between them. There are some interesting preliminary results that point to the possibility that bilingual children must discover strategies for effective speech production. For example, Nicoladis et al. (2005) showed that bilingual children gestured more than monolingual children when telling back a story. They interpreted these results to suggest that the bilingual children were using gestures to help access words and were doing so efficiently. To test this interpretation, it would be interesting to verify if gestures were more likely to occur when the underlying structures in the two languages were different. If so, then bilingual children might be using gestures to lighten the cognitive load of choosing between two languages (see Goldin-Meadow, 2000, for a discussion of some of the possible functions of gestures).

Lastly, bilingual children have shown slight advantages over monolingual children in terms of communicative competence, theory of mind, and selective attention. Researchers have argued that these advantages are due to bilingual children's experience with choosing appropriate language(s) for the context (e.g., Bialystok, 2001; Nicoladis et al., 2005). If this interpretation is correct, then children's early experience with language choice could lead them to early insight into the minds of others and attention to relevant cues, at least in linguistic and social domains. To test this interpretation, it would be particularly crucial to document changes in theory of mind and selective attention longitudinally as children acquire a second language in the preschool years.

In closing, it is clear that bilingualism does not lead to confusion in development, as once feared by researchers and parents alike. The literature I reviewed here showed that bilingualism does impact on both language and cognitive development in small and systematic ways. The differences between bilingualism and monolingualism allow us insights into how development unfolds. For example, we can uncover where experience using a language makes a difference in how that language develops (e.g., Tomasello, 2000). As further research with bilinguals is carried out, we will gain additional insights into how development takes place in all children.

List of Key Words and Concepts

Bilingual bootstrapping, Canonical babbling, Cognitive flexibility, Communicative competence, Control of attention, Cross-linguistic transfer, Diary Studies, False belief task, Idiosyncratic input, Theory of mind, Vocabulary size, Sequential bilingualism, Simultaneous bilinguals, Speech production, Strategy use

Internet Sites Related to Development and Bilingualism

Brain Connection: <http://www.brainconnection.com/topics/?main=fa/cognitive-bilingualism4>

Child Language Data Exchange System: <http://childes.psy.cmu.edu/>

Developmental Psychology: http://www.nichd.nih.gov/crmc/cdb/p_lang.htm

Language Literacy Lab: <http://myweb.dal.ca/sdeacon/>

National Institute of Child Health and Human Development: http://www.nichd.nih.gov/crmc/cdb/p_lang.htm

The Virtual Center for Language Acquisition: http://www.clal.cornell.edu/vcla/first_lang_mems.html

Discussion Questions

1. What is cognitive flexibility?
2. After reading this chapter, what is your opinion on child bilingualism? That is, if you had the opportunity, would you raise your child bilingual or monolingual?
3. What are some examples of cross-linguistic transfer?
4. Is there any evidence bilingualism negatively affects the development of language acquisition?
5. How do language developmental psychologists measure vocabulary size?

Suggested Research Projects

1. Amongst your classmates, find someone who knows a few words in a language other than the base language that most of your classmates speak. Have that person choose a set of 10–12 words and then attempt to teach that language to members of your class (different types of words can be obtained from the website: <http://www.math.yorku.ca/SCS/Online/paivio/>). First, the class should be divided into two groups. For one group, discuss the meanings of the to-be-acquired words, use them in a sentence, and have the members of the group create sentences in English where that new-language word would fit appropriately. You can call this group the *semantic group* because they will be creating sentences that require knowing the meaning of the word. For the other group, simply have each member of the group study the new word with its English translation, in a silent mode. You can call this group the *rote group* because this group will be trying to just memorize the words. A few days later, test each group on the words by providing an English sentence and a list of the newly-learned words and having them match the words to the appropriate sentences. This test should be a surprise, or what is called a test of “incidental” learning. So don’t tell the students ahead of time that they will be tested. Which group performed best? What kinds of strategies did the student report having used when either studying the lists or trying to retrieve the information they had learned, from memory?
2. As a follow up project, take the very same set of words from the first project, and have each student in the class administer the same procedure to a child they know, with the parent’s and child’s permission. Remember, assign half of the class to the *semantic group*, as in the previous Group 1, and assign the rest of the students to the *rote group*, Group 2. Have all of the classmates share their data as a group, once the task has been completed. Try to work within a small age range for the children, or perhaps include children who share the same age. Be sure that all students administering the task wait the same amount of time before testing the children again. Also, the examples used for sentences and definitions should be created for the reading level of the children who will be involved in the study. What did you find?

Suggested Readings

- Ben-Zeev, S. (1977). Mechanisms by which childhood bilingualism affects understanding of language and cognitive structures. In P. A. Hornby (Ed.), *Bilingualism: Psychological, social, and educational implications*. New York: Academic Press.

- de Houwer, A. (1995). Bilingual language acquisition. In P. Fletcher & B. MacWhinney (Eds.), *The handbook of child language* (pp. 219–250). Oxford, UK: Blackwell.
- Genesee, F. (1989). Early bilingual development: One language or two? *Journal of Child Language*, 16, 161–179.

References

- Alibali, M. W., Kita, S., & Young, A. J. (2000). Gesture and the process of speech production: We think, therefore we gesture. *Language and Cognitive Processes*, 15, 569–613.
- Bartsch, K., & Wellman, H. M. (1995). *Children talk about the mind*. New York: Oxford University Press.
- Ben-Zeev, S. (1977). Mechanisms by which childhood bilingualism affects understanding of language and cognitive structures. In P. A. Hornby (Ed.), *Bilingualism: Psychological, social, and educational implications*. New York: Academic Press.
- Bialystok, E. (2001). *Bilingualism in development: Language, literacy, and cognition*. New York: Cambridge University Press.
- Bialystok, E., Majumder, S., & Martin, M. M. (2003). Developing phonological awareness: Is there a bilingual advantage? *Applied Psycholinguistics*, 24, 27–44.
- Bialystok, E., & Senman, L. (2004). Executive processes in appearance–reality tasks: The role of inhibition of attention and symbolic representation. *Child Development*, 75, 562–579.
- Bybee, J. (1995). Regular morphology and the lexicon. *Language and Cognitive Processes*, 10, 425–455.
- Capute, A. J., Palmer, F. B., Shapiro, B. K., Wachtel, R. C., Schmidt, S., & Ross, A. (1986). Clinical linguistic and auditory milestone scale: Prediction of cognition in infancy. *Developmental Medicine and Child Neurology*, 28, 762–771.
- Clark, E. V., Hecht, B. F., & Mulford, R. C. (1986). Coining complex compounds in English: Affixes and word order in acquisition. *Linguistics*, 24, 7–29.
- Comeau, L., Genesee, F., & Lapaquette, L. (2003). The modeling hypothesis and child bilingual code-mixing. *International Journal of Bilingualism*, 7, 113–126.
- Cromdal, J. (1999). Childhood bilingualism and metalinguistic skills: Analysis and control in young Swedish-English bilinguals. *Applied Psycholinguistics*, 20, 1–20.
- Davidson, D., Jergovic, D., Inami, Z., & Theodos, V. (1997). Monolingual and bilingual children's use of the mutual exclusivity constraint. *Journal of Child Language*, 24, 3–24.
- de Houwer, A. (1995). Bilingual language acquisition. In P. Fletcher & B. MacWhinney (Eds.), *The handbook of child language* (pp. 219–250). Oxford, UK: Blackwell.
- de Houwer, A. (2005). Early bilingual acquisition: Focus on morphosyntax and the separate development hypothesis. In J. Kroll & A. De Groot (Eds.), *The handbook of bilingualism* (pp. 30–48). Oxford: Oxford University Press.
- Doyle, A. B., Champagne, M., & Segalowitz, N. (1978). Some issues in the assessment of linguistic consequences of early bilingualism. In M. Paradis (Ed.), *Aspects of bilingualism* (pp. 13–20). Columbia, SC: Hornbeam Press.
- Eilers, R. E., Pearson, B. Z., & Cobo-Lewis, A. B. (under review). *The social circumstances of childhood bilingualism: The Miami experience*.
- Ferreira, V. S., & Dell, G. S. (2000). Effect of ambiguity and lexical availability on syntactic and lexical production. *Cognitive Psychology*, 40, 296–340.
- Frick-Horbury, D., & Guttertag, R. E. (1998). The effects of restricting hand gesture production on lexical retrieval and free recall. *American Journal of Psychology*, 1, 43–62.
- Gawlitsek-Maiwald, I., & Tracy, R. (1996). Bilingual bootstrapping. *Linguistics*, 34, 901–926.
- Genesee, F. (1989). Early bilingual development: One language or two? *Journal of Child Language*, 16, 161–179.

- Genesee, F., Boivin, I., & Nicoladis, E. (1996). Bilingual children talking with monolingual adults: A study of bilingual communicative competence. *Applied Psycholinguistics*, 17, 427–442.
- Genesee, F., Nicoladis, E., & Paradis, J. (1995). Language differentiation in early bilingual development. *Journal of Child Language*, 22, 611–631.
- Goetz, P. J. (2003). The effects of bilingualism on theory of mind development. *Bilingualism: Language and Cognition*, 6, 1–15.
- Goldin-Meadow, S. (2000). Beyond words: The importance of gestures to researchers and learners. *Child Development*, 71, 231–239.
- Gollan, T. H., & Silverberg, N. B. (2001). Tip-of-the-tongue states in Hebrew-English bilinguals. *Bilingualism: Language and Cognition*, 4, 63–83.
- Grosjean, F. (2001). The bilingual's language modes. In J. L. Nicol (Ed.), *One mind, two languages: Bilingual language processing* (pp. 1–22). Oxford: Blackwell.
- Holm, A., & Dodd, B. (1999). A longitudinal study of the phonological development of two Cantonese-English bilingual children. *Applied Psycholinguistics*, 20, 349–376.
- Jean-Louis, B. (1999). *Does childhood bilingualism facilitate the development of theory of mind?* Unpublished PhD dissertation, Yale University, New Haven, CT.
- Lanza, E. (1992). Can bilingual two-year-olds code-switch? *Journal of Child Language*, 19, 633–658.
- Leopold, W. (1949). *Speech development of a bilingual child* (Vol. 4). Evanston, IL: Northwestern University Press.
- Markman, E. M., Wasow, J. L., & Hansen, M. B. (2003). Use of the mutual exclusivity assumption by young word learners. *Cognitive Psychology*, 47, 241–275.
- Müller, N., & Hulk, A. (2001). Crosslinguistic influence in bilingual language acquisition: Italian and French as recipient languages. *Bilingualism: Language and Cognition*, 4, 1–21.
- Nicoladis, E. (2002). Some gestures develop in conjunction with spoken language development and others don't: Evidence from bilingual preschoolers. *Journal of Nonverbal Behavior*, 26, 241–266.
- Nicoladis, E. (2003). Cross-linguistic transfer in deverbal compounds of preschool bilingual children. *Bilingualism: Language and Cognition*, 6, 17–31.
- Nicoladis, E. (2006). Cross-linguistic transfer in adjective-noun strings by preschool bilingual children. *Bilingualism: Language and Cognition*, 9, 15–32.
- Nicoladis, E., & Genesee, F. (1996). A longitudinal study of pragmatic differentiation in young bilingual children. *Language Learning*, 46, 439–464.
- Nicoladis, E., Kwong See, S., & Rhemtulla, M. (2005). Are mutual exclusivity violations guided by children's assumptions about people's word knowledge? Paper presented at the Jean Piaget Society, Vancouver, BC, Canada.
- Nicoladis, E., Mayberry, R., & Genesee, F. (1999). Gesture and early bilingual development. *Developmental Psychology*, 35, 514–526.
- Nicoladis, E., Palmer, A., & Marentette, P. F. (2007). The role of type and token frequency in using past tense morphemes correctly. *Developmental Science*, 10, 237–254.
- Nicoladis, E., Pika, S., & Marentette, P. F. (2005). *Gesturing bilingually: French-English bilingual children's gestures*. Paper presented at the International Congress for the Study of Child Language, Berlin, Germany.
- Nicoladis, E., & Secco, G. (2000). The role of a child's productive vocabulary in the language choice of a bilingual family. *First Language*, 58, 3–28.
- Oller, D. K., Eilers, R. E., Urbano, R., & Cobo-Lewis, A. B. (1997). Development of precursors to speech in infants exposed to two languages. *Journal of Child Language*, 24, 407–425.
- Paradis, J., & Genesee, F. (1996). Syntactic acquisition in bilingual children: Autonomous or interdependent? *Studies in Second Language Acquisition*, 18, 1–25.
- Paradis, J., & Navarro, S. (2003). Subject realization and crosslinguistic interference in the bilingual acquisition of Spanish and English: What is the role of the input? *Journal of Child Language*, 30, 371–393.
- Peal, E., & Lambert, W. E. (1962). The relation of bilingualism to intelligence. *Psychological Monographs*, 76, 1–23.

- Pearson, B. Z., Fernández, S. C., Lewedag, V. L., & Oller, D. K. (1997). The relation of input factors to lexical learning by bilingual infants (ages 10 to 30 months). *Applied Psycholinguistics*, 18, 41-58.
- Pearson, B. Z., Fernández, S. C., & Oller, D. K. (1993). Lexical development in bilingual infants and toddlers: Comparison to monolingual norms. *Language Learning*, 43, 93-120.
- Perner, J., Leekam, S. R., & Wimmer, H. (1987). Three-year-olds' difficulty with false belief: The case for a conceptual deficit. *British Journal of Developmental Psychology*, 5, 125-137.
- Pika, S., Nicoladis, E., & Marentette, P. F. (2006). A cross-cultural study on the use of gestures: Evidence for cross-linguistic transfer? *Bilingualism: Language and Cognition*, 9, 319-327.
- Ronjat, J. (1913). Le développement du langage chez un enfant bilingue. Paris: Champion.
- Tomasello, M. (2000). First steps toward a usage-based theory of language acquisition. *Cognitive Linguistics*, 11, 61-82.
- Vihman, M. M. (1996). *Phonological development*. Cambridge, MA: Blackwell Publishers.
- Vihman, M. M. (1998). A developmental perspective on codeswitching: Conversations between a pair of bilingual siblings. *International Journal of Bilingualism*, 2, 45-84.
- Volterra, V., & Taeschner, T. (1978). The acquisition and development of language by bilingual children. *Journal of Child Language*, 5, 311-326.
- Yip, V., & Matthews, S. (2000). Syntactic transfer in a Cantonese-English bilingual child. *Bilingualism: Language and Cognition*, 3, 193-208.