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THE PSYCHOLINGUISTICS OF EARLY BILINGUALISM

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Introduction

By definition, bilingual infants face a challenging learning problem. Language input contains a mixture of sounds, words, sentences, constructions, and conventions, and every language follows its own patterns at each level. Bilingual infants must master the systems for multiple languages simultaneously, despite considerably less experience with each language than monolinguals. Furthermore, bilingual infants do not merely receive less exposure to each language individually; they are also typically surrounded by speakers who vary in proficiency, mix languages, and have unequal balance in their use of each language (Byers-Heinlein & Fennell, 2014). Remarkably, even though they must absorb up to twice the unique information, bilingual infants' language skills do not develop twice as slowly as monolinguals' (Oller et al., 2007).

A growing body of research has begun to systematically examine the cognitive and psycholinguistic processes by which infants learn two languages concurrently. We summarize ten findings from contemporary research on early bilingualism, focusing on how children learn two languages simultaneously. As is typical of the literature, we define "bilingual infants" as children under 36 months who regularly hear two languages in their household or community environment, with each language representing at least 20% of their total input. We attempt to cover phenomena from a range of important domains: how infants become familiar with the sounds of their languages, how they learn the meanings of words, how they process different types of sentences, and how bilingualism may affect cognition beyond language.

Textbox 2.1 Key terms and concepts

Perceptual narrowing: The process by which infants become less sensitive over time to perceptual contrasts that are absent or rare in the environment (e.g., sounds not present in bilinguals' ambient languages)

Translation equivalents: Words in different languages for the same concept (e.g., *dog* in English and *perro* in Spanish refer to the same animal)

Total conceptual vocabulary: A measure of bilinguals' vocabulary that counts the number of concepts for which the child has a unique word (e.g., if a child knows both *dog* and *perro*, they receive credit only once)

Mutual exclusivity: The inference that a novel label is likely to refer to a novel object, rather than a known object

Code switching: The use of two languages within a sentence or conversation (see van Hell, 2023 [this volume])

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Critical issues and topics

Sounds

Learning language begins with the perception of sound, at least among hearing populations. To make sense of language, learners must attend to meaningful distinctions and ignore those that do not carry meaning. For bilingual infants, this requires learning to categorize their two languages as separate systems and adjusting their reliance on different cues when hearing each language. For instance, a Spanish-English bilingual must learn that the distinction between /b/ and /v/ can differentiate words such as *bat* and *vat* in English, but those sounds are part of a single category in Spanish. In this section, we discuss some of the first challenges that bilingual infants must resolve.

Bilingual infants can successfully discriminate between their two languages

A fundamental question about the nature of early bilingualism is whether bilingual infants "know" they are bilingual. That is, do infants recognize that they are hearing two languages, or do they interpret their input as one system with high inconsistency (Leopold, 1954)? Throughout their first year, bilingual infants detect changes from one of their languages to the other, even when hearing related languages (e.g., Spanish and Catalan: Bosch & Sebastián-Gallés, 2001), suggesting that they can distinguish languages perceptually. Thus, from a young age, children appear to recognize that there are different languages in their input (Byers-Heinlein, 2014). Bilinguals' ability to separate their languages is consistent with evidence from monolinguals that infants attend closely to sounds. From birth, monolingual infants distinguish languages with different rhythmic properties and show increased interest in their primary caregiver's native language (Mehler et al., 1988). Within the first six months, monolinguals develop even greater sensitivity to their native language (Nazzi et al., 2000). Therefore, it is unsurprising that bilingual infants develop similar expertise for each language that they hear regularly. In fact, young bilinguals may be more sensitive to differences between languages than monolinguals (Molnar et al., 2014; Kuipers & Thierry, 2012). Thus, bilingual infants' capacity to differentiate their languages seems to emerge from the combination of infants' auditory processing skills and sensitivity to their experiences.

Bilingual infants are slower than monolinguals to specialize in the sounds of their native languages

During the latter part of the first year, monolinguals lose their ability to discriminate non-native contrasts and become more attuned to contrasts that are meaningful in their native language. This specialization process ("perceptual narrowing"; see Textbox 2.1) is positively correlated with gaining proficiency in understanding the native language (Kuhl et al., 2006). In contrast, bilingual infants retain the ability to perceive non-native contrasts longer than monolinguals. For instance, around ten months, bilinguals continue to differentiate non-native consonant contrasts that monolinguals do not (Singh et al., 2017) and perceive categorical differences in lexical tone, even when neither of their languages uses tones contrastively (Petitto et al., 2012), suggesting that exposure to diverse sounds changes how infants attend to sounds more generally.

Bilingual infants learn more easily from familiar-sounding speakers

In addition to variability across languages, bilingual infants must contend with the variability found within languages, such as differences between speakers or accents. Accented speech presents a particular

challenge because subtle pronunciation differences carry social meaning yet must be disregarded to recognize speakers' intended referents. Monolingual infants learn new words more easily when they are produced by monolinguals (Mattock et al., 2010) and display social biases for native-accented speakers (Kinzler et al., 2007), which could be because these speakers sound familiar or because the speech that they produce is more consistent. Interestingly, bilingual infants learn new words more easily when they are produced by bilinguals (Fennell & Byers-Heinlein, 2014; Mattock et al., 2010), suggesting that they too benefit from familiar-sounding speech. Moreover, even though they tend to encounter non-native speakers, bilingual children, like monolinguals, prefer to befriend individuals with native (vs. foreign) accents (Souza et al., 2013). Thus, both monolinguals and bilinguals appear to process information more effectively when they hear speakers who sound typical of their environments.

Words

While children's knowledge of language was once evaluated mainly by what they produced, newer evidence shows that infants understand words well before they produce them (Bergelson & Swingley, 2012), highlighting the importance of considering both comprehension and production to fully understand language development (Thordardottir, 2011). At the same time, children's receptive and expressive vocabularies tend to be highly correlated (Marchman et al., 2010). Here, we describe the trajectory of early bilingual vocabulary growth and discuss how bilingual children's understanding of familiar words and strategies for acquiring new words compare to those of monolingual peers.

Bilingual children build their vocabularies at a similar rate as monolingual children

It is often assumed that bilingual children will show delays in vocabulary growth. However, evidence from diary studies, standardized questionnaires, and lab-based experiments all suggests that bilinguals demonstrate comprehension and produce their first words at similar ages as monolinguals (for review, see Fennell & Lew-Williams, 2018). Moreover, just as there are individual differences in the size and growth trajectory of vocabulary among monolingual children (Fenson et al., 1994), there is considerable heterogeneity among bilinguals (Conboy & Thal, 2006), and variability in children's early vocabulary predicts later language skills for both monolinguals and bilinguals (Duff et al., 2015; Hurtado et al., 2014). The supposition that bilingual children's vocabulary lags behind monolinguals' likely stems from comparing children's knowledge in a single language; bilinguals typically know fewer words than monolinguals of the same age when their knowledge is assessed in just one language (Oller et al., 2007; Pearson et al., 1997). But comparisons that account for both languages often show that bilingual children know more total words than monolinguals (de Houwer et al., 2014). A more conservative approach is to measure "total conceptual vocabulary," which approximates the number of unique concepts for which a child has a label (Textbox 2.1). It has been suggested that parents overreport children's knowledge of cross-language synonyms (also called "translation equivalents," Textbox 2.1), inflating estimates of vocabulary (Legacy et al., 2016). Based on total conceptual measures, monolinguals and bilinguals are often reported to know a similar number of words (Pearson et al., 1993; Thordardottir, 2011), although bilinguals' conceptual vocabularies may initially lag behind monolinguals' until around the age of three (Gonzalez-Barrero et al., 2020). Therefore, basic mechanisms *and* growth patterns in early vocabulary development appear to be shared among monolingual and bilingual children.

Bilingual children's vocabulary in each language is related to the input they receive within, but not across, languages

A key question for early bilingual research is whether children's knowledge of their languages develops together (Marchman et al., 2010). Generally, the size of a child's vocabulary in one language is not a good predictor of their vocabulary in the other (Conboy & Thal, 2006; Hurtado et al., 2014). Instead, children's vocabulary in a particular language depends on their history of experience with that language (Hurtado et al., 2014; Marchman et al., 2017; Place & Hoff, 2011; Thordardottir, 2011). Children know more words in their more frequently heard language and show deeper processing of words in that language (Legacy et al., 2016; Oller et al., 2007). From studies with monolinguals, it is widely accepted that children's knowledge of language is related to the quantity/quality of the input they receive (e.g., Hart & Risley, 1995). Interestingly, studies with monolingual children have inherent limitations in that they cannot separate child-specific factors (e.g., cognitive abilities) or general environmental factors (e.g., family socioeconomic status, parent investment, community norms) from the influence of language experience. However, studies with bilingual children can better dissociate these influences, since the same child receives different input in different languages (Marchmán et al., 2010; Pearson et al., 1997). Hurtado and colleagues (2014) reported that bilingual toddlers' relative exposure to Spanish vs. English predicted the ratio of Spanish:English words that they produced. This finding underscores that a child's learning in one language is driven by experience with that language, not by overall experience across both languages.

Strategies for learning new words can differ between bilingual and monolingual children

Language experience not only changes the number of words children know, but also how they learn new words. For instance, bilingual infants may be more flexible in the cues they deem relevant for meaning. At 18 months, monolingual infants do not map candidate words that differ only by non-native features (e.g., pitch contours) onto different objects (Hay et al., 2015), but bilinguals can use these cues to distinguish reference (Graf Estes & Hay, 2015). As their knowledge of their native language(s) increases, both monolingual and bilingual infants become less inclined to interpret tones or clicks as referentially meaningful when those features are not contrastive in their language (Graf Estes & Hay, 2015; May & Werker, 2014), providing additional evidence that experience changes the cues that infants consider for meaning. In addition to shaping the interpretation of sounds, bilingual experience seems to lead children to rely less on the assumption that there will be one-to-one mappings between labels and objects. Monolingual children tend to infer that unknown labels refer to novel objects (Markman & Wachtel, 1988), a phenomenon known as "mutual exclusivity" (see Textbox 2.1). To test how language experience influences children's use of this strategy, Byers-Heinlein and Werker (2009) presented monolingual, bilingual, and trilingual 17-month-olds with familiar and unfamiliar objects. While monolinguals reliably looked to the unfamiliar object upon hearing a novel label, bilinguals were only marginally more likely to do so, and trilinguals were at chance. Subsequent studies showed that bilingual infants and even adults are more willing than monolinguals to accept multiple labels for the same object (Benitez et al., 2016; Byers-Heinlein et al., 2014; Kandhadai et al., 2017). Importantly, bilinguals are not permanently incapable of using the heuristic that novel labels likely refer to novel objects; by three years, monolingual and bilingual children use mutual exclusivity equally (Frank & Poulin-Dubois, 2002). Thus, it appears that bilingual children develop this assumption more slowly and perhaps apply it more conservatively.

Sentences

Beyond learning individual words, infants must learn to combine words and understand them fluently in different contexts. Examining bilingual children's comprehension is important because it allows us to explore global effects of bilingual experience on children's language processing, to investigate the effects of experience with a specific language, and to observe how children separate and integrate two languages.

Bilingual infants' processing of each of their languages is largely independent

Just as children's vocabulary knowledge can vary both within and across languages, so too can their comprehension. For monolingual children, vocabulary development is tightly coupled with understanding spoken language (Fernald & Marchman, 2012). Bilingual children's processing efficiency is related to their vocabulary knowledge within a language, but not across languages (Hoff et al., 2018; Hurtado et al., 2014; Marchman et al., 2010). In addition, predictably, children show better comprehension of their more frequent language (Hurtado et al., 2014). While many studies show no significant relation between children's understanding of their two languages (Hurtado et al., 2014; Marchman et al., 2010; Potter et al., 2019), there have been reports of negative relations between children's skills across languages. For instance, for Spanish-English bilingual preschoolers in the U.S., the development of grammatical skills in English can be a negative predictor of Spanish proficiency (Hoff et al., 2018). Thus, children's specific experience with each language, rather than the total amount of input they experience, appears to drive their understanding.

Language switching can disrupt bilingual infants' processing, but only sometimes

Bilingual infants have to develop efficient processing skills in their two languages independently, and they also must be able to integrate the two languages in real time, including understanding sentences that contain words in both languages (e.g., *Look at the* perro*!*). Sentences that include such "code switching" (see van Hell, 2023 [this volume]) tend to slow listeners' processing, although not sizably. Byers-Heinlein and colleagues (2017) reported that 20-month-olds learning French and English were less accurate to recognize familiar nouns that appeared in mixed-language sentences compared to single-language sentences. Complementary studies showed that mixed-language sentences can disrupt comprehension for Spanish-English bilinguals of similar ages (Morini & Newman, 2019; Potter et al., 2019). A careful look at these results shows that not all switches between languages affect processing. For instance, switches spanning sentence boundaries (e.g., *That one looks fun! The dog!*) do not disrupt comprehension (Byers-Heinlein et al., 2017). Furthermore, there are important differences between children's dominant vs. non-dominant languages. Across different sentence types, children show better comprehension of nouns in their dominant language (Potter et al., 2019). Relatedly, children experience greater processing costs when hearing a switch from sentence frames in their dominant language to nouns in their non-dominant language, compared to vice versa (Byers-Heinlein et al., 2017; Potter et al., 2019). Given that infants can efficiently process the nouns in single-language sentences, this suggests subtle differences in how lexical knowledge interacts with language switching.

Consequences of bilingualism

Language processing recruits domain-general cognitive processes such as memory and attention (Saffran, 2003) and is intrinsically linked to social learning (Kinzler et al., 2007). Because dual-language environments contain complex interactions between different people speaking different languages, the added challenges of managing multilingual input can influence children's processing across a

variety of domains (Akhtar & Menjivar, 2012). Here, we review findings and debates about the effects of bilingualism on children's non-linguistic learning and behavior and consider mutual influences of language and cognition.

Bilingualism may or may not confer cognitive benefits

A widely-discussed topic in contemporary bilingual research is the idea that bilinguals often outperform monolinguals on tasks that require cognitive flexibility and control (Bialystok et al., 2012; Kovács & Mehler, 2009; Poulin-Dubois et al., 2011). Termed the "bilingual advantage" (see Poarch, 2023 [this volume]), differences between monolingual and bilingual participants have often been interpreted as evidence that the constant need to suppress distraction from another language supports the development of attentional control (Bialystok et al., 2012). Enhancements in bilinguals' ability to shift attention have even been observed in preverbal infants (Kovács & Mehler, 2009). This has led to speculation that monolingual-bilingual differences could arise from bilinguals' experience monitoring the use of language (Byers-Heinlein et al., 2017; Sebastián-Gallés et al., 2012). However, recently, researchers have questioned the reliability and size of these effects (Dick et al., 2019; Duñabeitia et al., 2014; Nichols et al., 2020; Paap & Greenberg, 2013), and it has been argued differences between monolingual and bilingual populations may be explained by other factors, such as socioeconomic status differences (Morton & Harper, 2007). Nevertheless, given that bilingual infants may show differences in their development of cognitive skills, we suggest these effects may be similar to benefits of other enriching experiences. For instance, exposure to rich linguistic input in monolingual environments is related to growth in cognitive skills including memory and attention (Rowe et al., 2017). Improvements on cognitive tasks have also been found after children receive training with music (Moreno et al., 2011) or engage in exercise programs (Davis et al., 2011). Therefore, cognitive skills appear to develop through diverse experiences, and exposure to multiple languages may be just one contributor.

Bilingual experience may heighten children's use of social cues

Using language is not a purely cognitive task, and bilingual environments present unique social challenges. To follow the conventions of their language communities and determine which people speak each of their languages, children must use a variety of information. For example, language input is often accompanied by visual cues, such as the presence of a talking face. Attending to speakers' mouths provides cues that support speech perception (Munhall & Vatikiotis-Bateson, 1998), while eyes can offer information about speakers' intent (Emery, 2000). Early in development, infants may need additional information to decode the speech signal, and younger infants tend to look more at mouths and shift their gaze more to eyes as they become increasingly skilled at processing speech (Lewkowicz & Hansen-Tift, 2012). Ayneto and Sebastián-Gallés (2017) showed that at eight months, bilingual infants tend to continue to look at mouths, while monolinguals have shifted to the eyes. Perhaps as a result of these different patterns of attention, bilingual, but not monolingual, infants of this age can differentiate languages using dynamic visual cues alone (Sebastián-Gallés et al., 2012), further supporting the view that bilingual exposure may change infants' social experience. However, some recent studies find no reliable differences in how monolingual and bilingual infants scan faces or use gaze-related cues (Byers-Heinlein et al., 2021; Morin-Lessard et al., 2019). The specific languages that children hear could help explain differences across studies. For instance, bilingual infants learning similar languages (Spanish and Catalan) show increased interest in the mouth compared to bilingual infants learning distinct pairs of languages (e.g., Spanish and German; Birulés et al., 2019). Infants hearing two similar-sounding languages may need more disambiguating information, leading them to attend to speakers' mouths. Alternatively, it may be that language experience exerts only minor influence on infants' attention, because infants in all environments must seek out information

that best supports their perception and learning (Potter & Lew-Williams, 2019). As children get older, their social environments become more complex, and it has been suggested that the need to communicate with people using different languages supports children's understanding of the social world (Byers-Heinlein et al., 2014; Yow & Markman, 2011). Young children often struggle to realize that other people's knowledge is different from theirs (Gopnik & Astington, 1988), and there is evidence that bilingual children outperform monolinguals in understanding other people's mental states, beliefs, and intentions. For example, bilingual children may be better able to understand that an informant cannot always see objects that are visible to the child (Fan et al., 2015), or may be more sensitive to social cues that help resolve ambiguity, such as gaze direction (Yow & Markman, 2011).

Theoretical perspectives and approaches

Across these ten key domains of research in early bilingualism, we have described how perceptual, cognitive, and social abilities shape children's learning of two languages. Although bilingualism is often described as a unique context for learning, we now seek to offer theoretical explanations that unite research on monolingual and bilingual learning. We argue that bilingual language development is best understood by considering how general learning mechanisms are deployed in complex auditory and social environments.

Sounds

Interestingly, differences between monolingual and bilingual infants' learning of sounds can be construed either as reflecting delays in bilinguals' language development, or as a perceptual advantage. The slower development of native-language biases could suggest that bilingual experience leads to deficits in early language skills, because monolinguals' ability to perceive non-native contrasts is *negatively* correlated with knowledge of their native language (Kuhl et al., 2005). Because bilingual infants have less experience with each language individually, they have fewer opportunities to learn which distinctions are relevant. Furthermore, bilingual environments contain more variability, including input from both native and non-native speakers (Byers-Heinlein & Fennell, 2014). The Processing Rich Information from Multidimensional Interactive Representations (PRIMIR) model (Curtin et al., 2011) posits that infants use distributional patterns of their input to infer the presence of different phonetic categories, and exposure to less consistent input could slow their convergence onto a particular set of contrasts, leading bilinguals to develop native language biases more slowly than monolinguals.

However, it can also be argued that the ability to perceive more sound contrasts reflects perceptual enhancement. Petitto and colleagues (2012) put forward the "perceptual wedge" hypothesis and propose that bilinguals' longer-lasting sensitivities reflect flexibility in cognition as well as perception that could both support infants' learning of the languages to which they are currently exposed and facilitate learning of new languages in the future. Regardless of whether bilingual infants' speech perception is viewed as delayed, enhanced, or merely different from monolinguals', the divergent developmental trajectory of monolingual and bilingual infants highlights the fact that infants' sensitivities are tuned by their experience with language.

Words

In monolingual environments, there are likely to be highly reliable co-occurrences between an object and its label, and theories of cross-situational word learning suggest that children learn new words by uncovering these associations (Smith & Yu, 2008). In contrast, in bilingual environments, the same object is called by different names, and learners must track multiple labels for the same object. Regular experience with multiple languages appears to change learners' assumptions about

the statistical relations in the environment. Benitez and colleagues (2016) presented adults with objects that consistently co-occurred with a single label and other objects that co-occurred equally often with two different labels, creating competition. Adults with multilingual experience appeared to have less difficulty resolving competition between labels. Thus, being regularly presented with cases in which multiple names are used with roughly equal probability to refer to the same object reduces the bias toward mutual exclusivity. The emergence of different learning strategies highlights how examining differences between children growing up in different types of language environments can provide insight into the fundamental mechanisms of early learning.

Sentences

We have argued that the effects of language switching can be understood by considering how young learners combine information in processing, notably their learning of statistical regularities of their environment and their emerging knowledge of individual words (Potter et al., 2019). Hearing words following a familiar sentence frame (e.g., *Look at the . . .*) facilitates comprehension for both monolinguals and bilinguals (Fernald & Hurtado, 2006; Morini & Newman, 2019). This is consistent with statistical learning accounts that emphasize that infants are attuned to predictable co-occurrences (Saffran, 2003). Because language switches are less frequent than single-language utterances (Byers-Heinlein, 2014), they interfere with comprehension. Likewise, because children encounter words in their dominant language more often, they likely have more robust knowledge of these words (Goodman et al., 2008), which allows them to overcome the difficulty of a switch from their non-dominant to dominant language more easily than in the reverse direction. Therefore, it appears that differences in how bilingual infants process single- and mixed-language sentences in their two languages can be attributed to general principles of statistical learning and sensitivity to word frequency.

Consequences of bilingualism

If, as some studies show, bilingual experience can shape infants' cognition and use of social cues, then the question becomes why. We consider three potential explanations, but they are neither mutually exclusive, nor likely to be complete. One possibility is that processing the dynamics of bilingual input is demanding, and therefore could be enriching. For instance, Byers-Heinlein and colleagues (2017) showed that comprehending certain types of bilingual input, such as code switches, requires increased effort, which could be a "desirable difficulty" that underlies later-observed differences in cognitive flexibility and learning (see also Bogulski et al., 2019). Another possibility is that bilingual experience heightens children's attention to nonverbal cues, such as eye gaze and gesture, which may be useful across language contexts for engaging in successful communication. This dynamic use of reliable cues may support children's learning (Potter & Lew-Williams, 2019), with benefits for social cognition. A third possibility is that experience interacting with people with variable language knowledge helps children understand that different people hold different knowledge states. Bilingual infants recognize that monolingual speakers do not understand words in a foreign language (Byers-Heinlein et al., 2014), and bilingual children readily adjust their language use when interacting with monolingual or bilingual adults (Genesee et al., 1996). This adaptation reflects sensitivity to other people's knowledge, and differences in children's early social experience may have downstream consequences for understanding the social world, as well as cross-domain effects on their cognition.

Current trends and future directions

There has a been a dramatic increase in research on early bilingualism over the last ten years (Fennell & Lew-Williams, 2018), which aims to capture the linguistic realities of many infants' experience

and take advantage of the "natural experiment" of bilingual environments (Pearson et al., 1997). We have highlighted important progress that this field has made in deepening our understanding of both the unique psycholinguistic challenges that bilingual infants face and the general cognitive processes involved in early language learning. We aimed to increase links between bilingualism research and the cognitive sciences by explaining how ten key findings about early bilingualism can be understood through the same domain-general cognitive mechanisms that support monolingual development. Significant gaps in knowledge still remain that need to be addressed to provide a clearer picture of the nature of bilingual experience and learning (see Textbox 2.2). Here, we propose a few areas that we hope will be addressed in future research.

Commonalities and differences across different languages and populations

We have mostly described research findings as though they apply to all groups of bilinguals, yet there may be very different challenges associated with learning different pairs of languages (or more than two languages) as well across different cultural contexts. For instance, children learning related languages, such as Spanish and Catalan, may rely on different cues to segregate their languages, compared to children learning typologically distinct languages, such as English and Mandarin. Since related languages share more cognates, this overlap could influence how children learn words across languages. Moreover, some communities are more bilingual than others, and languages have a more or less prestigious status (political or otherwise) in the larger society. Children's learning of the majority and minority languages often differ (Wright et al., 2000), further highlighting the importance of exploring similarities and differences across bilingual populations.

Scrutinizing children's daily experience

Every bilingual home is different, and parents often struggle to report how much their child hears of one language over another. There have been recent endeavors to describe the speech that children hear in different cultures (e.g., Bergelson et al., 2019; Casillas et al., 2020; Cristià et al., 2019), but a relative paucity of data exists from bilingual homes (but see Hurtado et al., 2014; Marchman et al., 2017; Orena et al., 2019). Observations from bilingual homes could offer the opportunity to explore "how much" input children typically need in each language to become proficient and to test how differences in parents' strategies (e.g., mixing vs. separating languages; having different people interact with the child in different languages) influence children's language outcomes. In addition, there is little information available about the language(s) that bilingual children produce in different settings, and it could be informative to understand how children's skills and preferences influence their learning environments.

Assessing and supporting children at risk for language difficulties

Finally, it is important to remember that many bilingual families are concerned about whether the presence of multiple languages will impede vs. support their child's development and success in school. In particular, many want to know how to best determine when bilingual children have language delays and how to accurately assess their knowledge in multiple languages at once. A deeper understanding of how to evaluate childhood bilingualism and second language learning will be critical for building theories of cognition and language, as well as informing policies, therapies, and educational efforts focused on bilingual populations.

Textbox 2.2 Open questions and issues

How similar or different is children's language learning across different bilingual communities?
How do characteristics of language input that bilingual children hear change over time?
How much experience do bilingual children need with a language to become proficient?
What are the cognitive and linguistic benefits of early bilingualism?
What are the learning-related vulnerabilities, if any, of growing up in a bilingual environment?

Further reading

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This book discusses early learning of sounds.

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This article describes research on vocabulary knowledge and language processing.

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