California's Best Practices for YOUNG DUAL LANGUAGE LEARNERS

Research Overview Papers

GOVERNOR'S STATE ADVISORY COUNCIL ON EARLY LEARNING AND CARE ♦ SACRAMENTO, 2013

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Governor's State Advisory Council on Early Learning and Care

Sacramento, 2013

Publishing Information

California's Best Practices for Young Dual Language Learners: Research Overview Papers was prepared under the direction of the Child Development Division, California Department of Education (CDE), for the State Advisory Council on Early Learning and Care. This publication was edited by Faye Ong and John McLean, working in cooperation with Cecelia Fisher-Dahms, Education Administrator I, Quality Improvement Office, Child Development Division. It was designed and prepared by the staff of CDE Press for online posting, with the cover created by Tuyet Truong. The document was published by the Department of Education, 1430 N Street, Sacramento, CA 95814. It was distributed under the provisions of the Library Distribution Act and *Government Code* Section 11096.

ISBN 978-0-8011-1742-8

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A Message from the State Advisory Council Co-Chairs

We are pleased to present *California's Best Practices for Young Dual Language Learners: Research Overview Papers*, a publication we believe will provide early childhood educators with valuable information on the most current research on the development of young dual language learners. This series of research overviews spans the disciplines of neuroscience, cognitive science, developmental psychology, assessment, educational research, family engagement, and special needs. Insights from the reviews informed the creation of the forthcoming *California Preschool Program Guidelines*, a publication that addresses how to provide high-quality, developmentally and individually appropriate preschool services for young children. In particular, information from the research reviews guided the formulation of best practices for supporting the learning and development of California's young dual language learners.

The first two research overviews focus on different aspects of dual language development. Paper 1 ("Neuroscience Research: How Experience with One or More Languages Affects the Developing Brain") reviews basic neuroscience and developmental cognitive neuroscience research relevant to language development. The paper discusses the general process of learning language in the early years, whether learning one language or two or more languages. The paper also addresses differences in how the brain processes language when learning two or more languages, and concludes that these differences do not reflect delays or deficits, but rather are adaptations to the unique circumstances of learning two or more languages—which, in turn, can lead to developmental advantages when two or more languages are supported through enriched learning opportunities.

Paper 2 ("Cognitive Consequences of Dual Language Learning: Cognitive Function, Language and Literacy, Science and Mathematics, and Social–Emotional Development") summarizes the current research on the cognitive consequences of dual language development. The paper highlights how dual language learning affects general cognitive functioning, including executive control and memory, as well as areas of learning that have a strong cognitive component, such as language and literacy, mathematics, science, and social–emotional development.

The next two papers focus on the preschool program, addressing programmatic elements, teaching practices, and collaboration with families. Paper 3 ("Program Elements and Teaching Practices to Support Young Dual Language Learners") summarizes research on program

elements and strategies that effectively support the learning and development of young dual language learners in preschool. The authors describe the elements of high-quality preschool that benefit all children and identify additional practices that specifically enhance the learning and development of young dual language learners. In particular, the paper discusses the importance of providing continuing support for children's home language as they learn English, as home language proficiency is foundational for learning and development across all domains including English-language development.

Paper 4 ("Family Engagement in Early Childhood Programs: Serving Families of Dual Language Learners") reviews the many positive developmental child outcomes that are associated with family engagement. The authors underscore the importance of strengthening family engagement in preschool for children's future learning and families' continued participation in educational settings. The paper pays particular attention to how to foster family engagement with families of young dual language learners. Topics include addressing the bilingual and bicultural needs of families, developing warm and mutually respectful relationships, engaging in regular two-way communication, and approaching families with a strength-based perspective.

The final two papers examine assessment, early intervention, and young dual language learners with special needs. Paper 5 ("Assessment of Young Dual Language Learners in Preschool") focuses on the importance of accurate and valid assessment of young dual language learners' development and achievement. The paper discusses the need to take into account linguistic, cultural, and background considerations when assessing young dual language learners. Two specific purposes of assessment are addressed: (1) observational assessment for instructional decision making and improvement, and (2) assessment for screening and referral of children who may have special needs. The paper also makes clear that assessments must be valid, reliable, and linguistically and culturally appropriate. It closes with guidance for practitioners on assessing young dual language learners, including a flowchart and assessment matrix with specific questions and suggestions that can guide teachers' decisions.

Paper 6 ("Early Intervention and Young Dual Language Learners with Special Needs") addresses both the language development of young dual language learners with special needs and key considerations when choosing the language for intervention. The overview states that children with a range of special needs can learn more than one language. In fact, children with language disorders can apply their home language skills when learning a second language, which

in many cases results in a greater rate of learning of the second language. Of particular note, the authors found that the use of the home language in intervention does not slow the acquisition of the second language.

As a set, these six research overviews reflect the most current research related to the learning and development of young dual language learners. They provide insight into how young dual language learners learn two languages, and also how they learn and develop in other domains. At the same time, the research summaries provide guidance to early childhood educators on how to support the learning and development of young dual language learners in preschool programs. We hope that these research overviews will be an invaluable resource for supporting the learning and development of young dual language learners in California's preschool programs.

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Acknowledgments

California's Best Practices for Young Dual Language Learners: Research Overview Papers was developed with the support of the California Department of Education and the leadership of WestEd project directors Peter Mangione and Ann-Marie Wiese, as well as project manager Katie Monahan, in collaboration with Linda Espinosa, the lead researcher for the project.

This research project of the California State Advisory Council on Early Learning and Care was made possible through American Recovery and Reinvestment Act (ARRA) funds granted to California under the Improving Head Start for School Readiness Act of 2007, with the California Department of Education as the lead agency.

The following individuals are gratefully acknowledged for their expertise and contributions to this project:

Eugene E. Garcia, Arizona State University (reviewer for Paper 2 and Paper 3)

Gisela Jia, Lehman College (contribution to Paper 1)

Marlene Zepeda, California State University, Los Angeles (contribution to Paper 2)

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Paper 1

Neuroscience Research:

How Experience with One or More Languages Affects the Developing Brain

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Over the past several decades, improvements in technology have increasingly allowed researchers to address questions regarding human brain and cognitive development. One type of research question concerns whether early experiences alter perception and information-processing systems in ways that impact children's early learning and future outcomes. This paper focuses on the question of whether growing up with two or more languages, instead of only one, has small effects on brain function and, subsequently, on future language learning. A promise of developmental cognitive neuroscience research is that it can help inform best practices in education. However, a pitfall is that neuroscience research findings are sometimes misinterpreted by the public and by members of the educational community, and such misinterpretations may be used to justify questionable educational practices.

The goal of this paper is to review some key findings from basic neuroscience and developmental cognitive neuroscience research that are relevant to the preschool education of young dual language learners (DLLs), and to provide the reader with a conceptual framework for understanding those findings. The research reviewed includes a growing body of studies that use measures of brain activity, which tap into the organization and functioning of language-relevant neural systems in ways that measures of young children's behaviors cannot. Together with studies of children's behaviors, including performance on tests and other structured tasks, the brain-imaging studies have led to the following conclusions:

1. Language experience affects the organization of the neural systems involved in learning, storing, processing, and producing language (i.e., there is evidence of structural and functional differences between the brains of monolingual learners and DLLs).
2. Dual language learning and use involve some different cognitive processes than single language learning and use.
3. The effects of language learning experiences on the brain facilitate and constrain further learning, and these experiential effects may be what are often referred to as "critical period" effects in second language acquisition.

In addition, this paper will attempt to provide a realistic view of how practitioners and policymakers can translate evidence from neuroscience research to best practices in the education of young DLLs.

A Conceptual Framework: Neuroconstructivism and Language Learning

The *neuroconstructivist* approach to cognitive development (Karmiloff-Smith 2008; Mareschal et al. 2007; Westermann et al. 2007) provides a theoretical framework for thinking about relationships between children's early language experiences (such as dual language learning), children's skills and behaviors in each language, and brain development. In contrast with frameworks that pose questions regarding the relative roles of "nature" and "nurture" in various aspects of development, **neuroconstructivism** assumes that a dynamic interplay between nature and nurture influences both the structure and the functional organization of the brain throughout development (for similar approaches, see Diamond 2009; Gottlieb 2007; Johnson 2000). Moreover, **neuroconstructivist** and related approaches do not assume that there is a unidirectional causal path from genes, to the maturation (i.e., physical growth) of particular brain areas, to the use of those brain areas for cognitive behaviors such as language (see Paper 2, Development Across Domains, for more information about the relationship between dual language development and cognition). Such approaches do not assume that there is a biological clock that determines when the brain will be ready for particular aspects of language learning to take place or when a "critical period" for learning aspects of language ends. Instead, these frameworks assume that specialized systems for complex cognitive behaviors such as language emerge as a product of experience, and that there are bidirectional influences between genes, structural brain changes, and cognitive functions. According to this view, humans inherit a genetic blueprint that guides certain aspects of development, but the environment can influence which genes are expressed (this process is known as **probabilistic epigenesis**); genetic influences on brain maturation can also influence how much a child can take in, and thus learn, from his or her environment at various points in development; and previous learning can influence further learning by changing the brain's structure and function (Gottlieb 2007). In sum, neuroconstructivism views brain development as being dynamic throughout the life span rather than ending after a particular end-state of maturation is reached. Cognition is thought to be constructed in a progressive manner, with new cognitive abilities based on previous, simpler ones. That is, development itself changes the ways that further development occurs (Mareschal et al. 2007).

This paper will review how the neuroconstructivist framework might be applied to thinking about the following dynamic aspects of dual language learning and use that have been noted in the scientific literature:

- differences in brain structure and function between bilingual individuals (who control two different vocabularies, sets of speech sounds, and systems of grammatical rules) and monolingual individuals (who control only one language);
- changes in brain structure and function that occur within individuals as they learn another language, or as they become more or less proficient in one of the languages that they already know due to increases or decreases in use over time;
- different patterns of brain activity for processing each of the same individuals' languages, with which they have different experiences and levels of expertise, even when the two languages are acquired in early childhood;
- the apparent ease of learning a second language during early childhood compared with later childhood or adulthood (i.e., what is commonly known as "critical period" effects in second-language acquisition), as well as cases of individuals who reach native-like proficiency in a language that they begin to learn at later ages.

As discussed by Mareschal and others (2007), the goal of neuroconstructivism is not to reduce complex cognitive behaviors or functions to descriptions at the neural level or to map functions to specific regions of the brain. Instead, the goal is to develop models of how aspects of cognition, such as language, might emerge in a brain that is embodied within a developing human, which in turn is embedded in a physical and social environment. Thus, cognitive behaviors, such as language knowledge and use, are thought to be influenced by external physical and social experiences. A central tenet of the neuroconstructivist approach is that knowledge becomes represented in the brain through the progressive elaboration of cortical structures. Thus, in order to consider how the neuroconstructivist framework might be applied to dual language learning and use, the reader needs to consider some key aspects of early brain development and how they might be influenced by the contexts in which many preschool DLLs develop. These are summarized in the next section.

Key Events in Brain Development

Early brain development has been characterized as the product of *progressive* (i.e., additive) and *regressive* (i.e., eliminative) events that work together to shape the brain and that are essential for normal development. These events may be predetermined by genetics, may occur spontaneously, or may be influenced by events in the environment (referred to as "experience-dependent" aspects of brain development; for example, see Greenough, Black, and Wallace 2002). An organism's experiences are mediated by neural activity, and this activity influences how some neural structures are added, eliminated, or become active (Mareschal et al. 2007). Examples of progressive events in brain development are ***neurogenesis,*** *synaptogenesis,* and *myelination;* regressive events include ***programmed cell death*** and *synaptic pruning* (see below, for further explanation). Another key event in brain development that may also be explained by neuroconstructivism is the specialization of networks of **neurons** for particular sensory, perceptual, motor, and cognitive functions (Johnson 2000). Practitioners should be aware of what is known, as well as what is not known, about how these events relate to particular experiences of young DLLs, such as the timing and contexts of first- and second-language learning. Practitioners should also be aware of the dynamic nature of brain development throughout the life span, and its implications for language learning. This section provides a brief overview of several key aspects of development in the *cerebral cortex,* the outermost layers of the brain most important for language and cognitive functions, and a discussion of the implications for dual language learning. (For more comprehensive reviews of the literature on human brain development, see Brown and Jernigan 2012; Clancy and Finlay 2001; Lenroot and Giedd 2006; Sowell, Thompson, and Toga 2004.)

During brain development, neurons (nerve cells) are generated in regions called **proliferative zones** (neurogenesis); then migrate to particular destinations in the brain; differentiate into particular subtypes; and project extensions from the cell body called **axons** (which carry neural activity to other neurons by transmitting chemoelectrical signals), and branch-like **dendrites** (which receive activity from other axons). The gap where the axon of one neuron forms a connection with either the dendrite or cell body of another neuron (and where the firing of one neuron triggers the firing of another neuron) is called a **synapse;** synaptogenesis refers to the formation of such connections. **Glial cells** are supporting cells for neurons; some glial cells form fatty sheaths around axons called **myelin,** which increase the speed of transmission of signals

between neurons. The formation of myelin is known as **myelination.**

Much of the process of neurogenesis and synaptogenesis occurs prenatally. Neurogenesis begins from the earliest moments of embryonic development, though it can continue throughout an individual's lifetime (see below). During the second trimester of gestation, connections between the **cerebral cortex** and the **thalamus** (a region of the brain below the cortex that receives input from peripheral visual and auditory systems) are established (Clancy and Finlay 2001). A **regressive** event called *programmed cell death* also occurs, beginning in the second trimester, and serves to refine the populations of neurons that work together (Clancy and Finlay 2001). It has been estimated that approximately half of all neurons generated during embryonic development are later eliminated, although the factors that determine which neurons survive are not completely understood (Lenroot and Giedd 2006; Mareschal et al. 2007). During the third trimester, connections between neurons in higher and lower processing areas within the cortex are formed, and the process of myelination begins in frequently used pathways (Clancy and Finlay 2001; Lenroot and Giedd 2006). Although myelination is not needed for the transmission of activity between neurons, it makes transmission more efficient. Toward the end of gestation (the eighth to ninth month), acceleration in synaptogenesis, a massive formation of new connections, begins. Many of these developments take place spontaneously, that is, without the influence of learning or experience from the external environment, but there is evidence that by the third trimester, the brain has begun to develop in response to sensory inputs, a form of "talking back to the body" (Clancy and Finlay 2001). In neuroconstructivist terms, the developing human brain can be thought of as being "embodied" within the fetus (Mareschal et al. 2007), which by the third trimester has already begun interacting with its environment by sensing sounds and other inputs.

By the time an infant is born, his or her brain possesses most of the neurons it will ever have, and major sensory pathways have already become organized to process input and are thus ready to learn from the external environment. Yet the brain is far from fully formed at birth. Brain development continues throughout childhood and into adulthood (Casey, Giedd, and Thomas 2000; Casey et al. 2005; Lebel and Beaulieu 2011; Shaw et al. 2008; Sowell, Thompson, and Toga 2004). Neurogenesis has been shown to occur throughout the lifetime in mammals in at least two areas of the brain, and one of these areas (the **hippocampus**, in the medial temporal cortex) is known to be important for certain types of memory formation (e.g.,

Eriksson et al. 1998; Manganas et al. 2007; for a review, see Deng, Aimone, and Gage 2010). There is also evidence that new neurons are born and become functional in response to challenging learning situations in adulthood (van Praag, Kempermann, and Gage 2000; Shors et al. 2012; Zhao, Deng, and Gage 2008). The extent to which new neurons are created and become functional across different areas of the cerebral cortex of human adults remains a matter of scientific debate. Moreover, the extent to which new neuron formation and functionality are influenced by experience and learning is also not resolved (Deng, Aimone, and Gage 2010).

Synaptogenesis also continues throughout the lifetime (for reviews, see Casey et al. 2005; Lenroot and Giedd 2006; van Praag, Kempermann, and Gage 2000). Experience-dependent synaptogenesis has been reported in studies of rodents reared in relatively "enriched" (as opposed to deprived) cages, and studies showing that multiple synapses form in adult animals in response to learning situations (Greenough, Black, and Wallace 2002; van Praag, Kempermann, and Gage 2000). Although it is obviously not possible to conduct studies that involve deprivation with humans, many of the causal links between experience and synaptogenesis that have been observed in other mammals are thought to also exist in humans. However, not all of synaptogenesis can be described as experience-dependent. For example, around the time of birth, there is an explosion in synaptogenesis across brain regions that does not seem to be caused by experience or learning. This overproduction of synapses leads to synaptic densities that exceed adult values within the first several years of a child's life, and ***synaptic pruning*** (the gradual elimination of unnecessary synapses) is needed to allow the synaptic densities of these different areas to decline to their more "mature" or optimal levels, for the brain to function efficiently (Clancy and Finlay 2001). **Synaptogenesis** and synaptic pruning work together to enhance the functioning of the brain throughout childhood and even into young adulthood (Lenroot and Giedd 2006; Petanjek et al. 2011).

Some practitioners may believe that having more synapses is necessarily "better" for language learning than having fewer synapses, and that for language learning to be optimal, it needs to occur during the time in development when the most synaptic connections are present, before synaptic pruning occurs. This belief may be, in part, based on an overly broad interpretation of the "use it or lose it" principle that has been demonstrated in neurobiological research (e.g., Shors et al. 2012). In fact, efficiency in language processing, and other aspects of cognitive development, is associated with the specialization and refinement of connections

between particular groups of neurons (see the next section for further details). Understanding how synapses are formed and strengthened is essential for understanding how the brain learns and represents information, such as speech sounds, words, and the rules of grammar.

Synaptic Pruning

- Most neurons are produced prior to birth, and connections between these neurons (synapses) begin to be formed prenatally. Soon after birth and during the first couple of years of life, an explosion in synaptogenesis (production of synapses) across brain regions leads to synaptic densities that exceed adult values.
- Through synaptic pruning (the gradual elimination of unnecessary synapses that occurs throughout childhood), synaptic densities decline to adult levels.
- Contrary to popular belief, there is no evidence that having more synapses is "better" for language learning than having fewer synapses. Efficiency in language processing is associated with the refinement of connections between particular groups of neurons that become specialized to work together.

It is known that connections between neurons at the synaptic juncture are strengthened with repeated activity; this process, called **Hebbian learning** (Hebb 1949), is one way that areas of the brain come to work with each other, and it is thought to be how knowledge is stored in the brain (Clancy and Finlay 2001). The principles of Hebbian learning and competition between neurons for connectivity are sometimes expressed in the phrases "'Cells that fire together, wire together' and 'those that don't, won't'" (e.g., Penn and Shatz 1999). Though few studies have directly linked measures of brain connectivity to aspects of cognitive development in humans (Casey et al. 2005; Fair et al. 2009), and though the actual relationships between the **progressive** and regressive events of early brain development and language development milestones are not yet understood, it is clear that much of early brain development takes place during the same time frame when many important developmental milestones in first-language acquisition occur (the beginnings of speech perception and production, learning of the first words, and the beginning use of sentences; see Centers for Disease Control and Prevention 2012, http://www.cdc.gov/ncbddd/actearly/milestones/index.html). First-language experience during the first few years of life is necessary for setting up a brain that can process a language efficiently (Boudreault and Mayberry 2006; Mayberry, Lock, and Kazmi 2002). However, there

is no definitive scientific evidence that second or subsequent languages also *need* to be learned during this same period in order for the brain to process those languages efficiently; this point is discussed in a later section of this paper.

Many areas of the brain are mature in structure and metabolic activity by the time of birth; this is known as "**absolute functionality**" (Clancy and Finlay 2001). For example, the auditory cortex, in the temporal lobe of the brain, can process speech and other complex sounds, even prior to birth, and late-term fetuses can remember some auditory information (Kisilevsky et al. 2009). Thus, it might be said that this region of the brain is equipped to process language from birth. However, it is important to recognize that several factors can prevent areas that have absolute functionality from being recruited for tasks in the same way that mature adult brains use those areas for the same tasks (i.e., "**task-specific functionality**"; Clancy and Finlay 2001).

The task-specific functionality of the auditory cortex may be limited by how this region communicates with other brain regions, which may be limited by immaturity of those other brain areas. The rate of synaptogenesis peaks and then declines earlier in posterior regions of the cortex than in frontal regions; thus the more posterior regions, including the auditory cortex, are said to "mature" earlier than the frontal regions (Huttenlocher and Dabholkar 1997). Additionally, myelination, whereby regularly used pathways become surrounded by fatty sheaths (myelin) that assist in the transmission of impulses between neurons, is a protracted process that continues into adulthood, and occurs at different rates across regions of the brain (Casey et. al. 2005). There is evidence that the efficiency of language processing relies on the myelination of axons that connect language areas in the brain (Aslin and Schlagger 2006; Nagy et al. 2004; Pujol et al. 2006; Sowell, Thompson, and Toga 2004). Task-specific functionality may also be limited by the brain's chemical properties. Different areas of the brain contain unique combinations of chemical substances necessary for synaptic functioning (**neurotransmitters**); information transfer in the brain occurs when these chemical substances are released from a neuron, across the synapse and onto the receptors of another neuron (Clancy and Finlay 2001). Several neurotransmitters have been linked to learning and developmental disorders (e.g., Hasselmo 2006; Marshall and Born 2007; Wise 2004). The distributions of neurotransmitters change with brain maturation, and, although direct mappings have not yet been discovered, it has been hypothesized that developmental changes in the amounts and types of neurotransmitters available for synaptic functioning within particular brain regions may affect the timing of

language acquisition (Clancy and Finlay 2001). Differences in maturation across regions may therefore limit how populations of neurons in those regions work together. For example, research using brain imaging has suggested that left-hemisphere language areas ("Broca's area," in the inferior region of the frontal lobe, and "Wernicke's area," in the superior region of the temporal lobe) begin to become functionally connected for speech perception between six and 12 months of age, as infants gain experience listening to and producing speech sounds (Imada et al. 2006; see below for further description).

Another factor that can limit the task-specific functionality of brain areas is the physical environment. Studies of fetuses and pre-term infants have shed light on this issue, because they show to what degree the fetal environment versus brain maturation limits learning. For example, by the third trimester of gestation, the auditory sensory and perceptual areas of the fetal brain are sufficiently developed to detect fine-grained distinctions between speech sounds (e.g., the difference between the vowel sounds "ah" and "ee"), yet fetuses cannot hear all of these differences in speech sounds due to the presence of amniotic fluid in the uterus, which filters out sounds with frequencies higher than 500 Hz (hertz, or cycles per second) (Kisilevsky et al. 2009). Studies of infants born pre-term have shown that the brain can encode distinctions between speech sounds during the late gestational period (i.e., 36 to 40 weeks gestation), but in full-term infants who are still in the uterus at this gestational age, the ability to encode speech-sound distinctions is limited by the fetal environment, which filters out important acoustic information. Cheour and colleagues (1998) used an auditory "oddball" mismatch experiment to test newborn pre-term infants' discrimination of two speech sounds: one served as a standard stimulus (repeated at constant intervals) and the other as a deviant stimulus (randomly presented 10 percent of the time within the stream of standards). Infants born preterm (30–35 weeks conceptual age at the time of testing) showed a discriminatory response to the deviant sounds in the form of larger amplitude voltage to deviants versus standards from 200 to 500 milliseconds (ms) after the **onset** of the syllable. This response was similar, though not identical, to that shown by full-term newborns, three-month-old infants, and adults using the same sets of sounds. It is important to note that the acoustic difference between the speech sounds used in this research was in the high frequencies (above 1700 Hz). Typically developing 30- to 35-week-old fetuses would not be exposed to frequencies above 500 Hz (i.e., the frequencies contained in many speech sounds) **in utero** because of the presence of amniotic fluid, but the fetuses' brains

are already able to process the full range of speech sounds. Thus, even before infants are born they are ready to perceive fine-grained distinctions between speech sounds, but the physical environment can have an important effect on how development proceeds.

Experience Affects the Organization of the Neural Systems Involved in Learning, Storing, Processing, and Producing Language

Given both the experience-dependent and experience-independent (i.e., maturational) aspects of brain development summarized in the previous section, differences across children in brain structure and/or function are expected, and such differences are also expected to lead to variability in future learning. A genetic factor that alters some aspect of early brain development (for example, one that causes a language learning disability) could diminish an individual's readiness to learn from the environment and thus affect subsequent experience-dependent aspects of brain development, further diminishing learning and widening the gap between the affected individual and peers. At the same time, even a typically developing brain could be altered given small variations in experience, such as amounts or types of language input. Thus, neuroconstructivism predicts that, in any group of learners (monolingual, bilingual, or multilingual), differences in experience will affect language functioning and subsequent learning. When children are learning two languages, differences in experience with each language could lead to slightly different patterns of activity for the functioning of each language, affecting subsequent learning in each language.

Other differences in early childhood experiences that are relevant to understanding the brain development of DLLs are those cultural influences that shape cognitive processing, and the effects of poverty. Neuroconstructivism predicts that culturally determined patterns of language input to children could lead to different patterns of brain activity and hence language learning. For example, Rogoff and colleagues (2003) have reported differences in attentional abilities and nonverbal communication between children from indigenous communities and children from Western communities, and they have also documented that parent educational level modulates these differences. Neuroconstructivism also predicts that any environmentally caused disruptions in normal brain development may hinder language learning, and subsequently affect the ways in which language is processed by the brain. Children living in poverty are more likely than children from middle-income homes to experience a range of risk factors that can affect brain development (Dilworth-Bart and Moore 2006; Farah et al. 2006; Hackman and Farah 2009;

Huston and Bentley 2009; Raizada and Kishiyama 2010). Raizada et al. (2008) found that when five-year-old children performed a rhyming task, the left inferior frontal gyrus (IFG)—an area known to be important for language processing in the adult brain—was active. However, there were differences in the activity levels across children of lower and higher socioeconomic status (SES). Children with higher SES were more likely to show specialization of function limited to the left IFG than were children with lower SES, who showed engagement of both the left and right hemisphere IFGs. Functional specialization to more narrow brain regions is typically viewed as a sign of brain efficiency. Thus, the functional specialization of the higher SES children was interpreted as reflecting the relatively stronger language skills that higher SES children tend to have, which are associated with more efficiency in how the brain processes language. Moreover, the study showed SES-related differences in the structure of the brain, both in white matter (myelin) and gray matter (neurons) in the left IFG of individual children.

The neuroconstructivist framework thus accounts for many of the experience-dependent aspects of brain and language development that have been documented in infants and young children, and leads to additional predictions regarding the brain development of DLLs. The next section provides a brief description of the brain measures that are used with infants and young children, and reviews how those techniques have been used to study how certain experiences with language affect the organization of the neural systems involved in language processing.

Overview of Techniques Used to Measure Brain Function

Much of the research on brain development in humans described in the previous section used noninvasive brain-imaging techniques, which are challenging to use with young children because they require study participants to remain fairly still and quiet during recording sessions. Nonetheless, functional brain measures are important complements to behavioral measures because they can detect learning without requiring an overt response from the study participant. Moreover, brain measures can discover subtle differences in processing that behavioral measures may not detect. In this section, some widely used techniques are described, and the application of those techniques to DLLs is discussed.

Functional magnetic resonance imaging (fMRI) and event-related potentials (ERP) are the techniques used most widely in research on language processing (see Dehaene-Lambertz, Hertz-Pannier, and Dubois 2006). The fMRI technique can be used to address the "where" question, in

that it has excellent spatial resolution and can pinpoint, on the order of millimeters, which regions are activated during particular aspects of language processing. In fMRI, hemodynamic (blood flow) responses of brain regions that occur several seconds after the firing of neurons indirectly measure brain activity. Because of this lapse, fMRI is not a direct measure of brain activity, and it does not measure brain activity on the order of milliseconds; however, it is remarkably good at localizing primary regions of activation (Heeger and Ress 2002).

In contrast to fMRI, the ERP technique can be used to address the "when" question, in that it has excellent temporal resolution and can pinpoint, on the order of milliseconds, stages in the time course of processing units of language when particular aspects of language knowledge (e.g., sound, meaning, grammar) are accessed. ERPs are direct records of neural responses to stimuli, obtained by placing electrodes on the scalp to detect the electrical activity produced by neurons in response to particular stimuli. ERPs are obtained by averaging together numerous epochs (like snapshots) of electrical brain activity that are time-locked to the onset of a stimulus (e.g., the beginning of a sound or word); thus they yield information about language processing on a millisecond-by-millisecond basis. For example, as an individual listens to the word *dogs*, the electrical brain activity that is involved in processing the word's sound structure (phonology), meaning (**semantics**), and grammatical properties (e.g., the plural *s*) can be recorded using ERPs. Because of the spreading of electrical potentials through the skull before they are recorded at the scalp, ERPs do not offer precise information about where processing occurs, though the location of sources may be inferred using mathematical algorithms (see Luck 2005, for discussion).

Two other imaging techniques that are used with young children are magnetoencephalography (MEG), which measures magnetic fields created by neural activity at the scalp, and functional near infrared spectroscopy (fNIRS), which measures neural activity indirectly by assessing changes in hemoglobin levels using infrared light that is directed at the skull (see Mareschal et al. 2007). Like ERPs, MEG is ideally suited for studying language processing because it has the same high temporal sensitivity as ERPs, but at the same time, it provides better spatial sensitivity given that magnetic fields are not distorted before they reach the scalp (Hari, Levänen, and Raij 2000). However, MEG has high operating costs. Functional NIRS allows researchers to determine in which part of the brain activation occurs, but, like fMRI, it has poor temporal resolution. MEG and fNIRS are just beginning to be used in developmental studies (e.g., Aslin and Mehler 2005; Imada et al. 2006; Petitto et al. 2011).

To understand how the brains of DLLs process language, it is necessary to consider evidence about how the brain processes language in adults and in monolingual children, because few neural-imaging studies with young DLLs have been published. The next sections highlight some of the most relevant available research on these populations, focusing on the role of experience in setting up language-processing systems and considering what we know and do not know about how this process unfolds in DLLs.

Experience and the Functional Specialization of the Brain during Language Learning

As discussed above, experience with language and other forms of sensory input are critical for setting up the brain's language-processing systems. In addition to affecting the formation and elimination of neurons and synapses, experience influences how brain areas become organized for language functions in specialized networks. The idea that there are "**functional specializations for language**" does not mean that activation occurs only in one area or that separate brain areas operate in isolation of one another. Brain areas are interconnected; they cannot be studied in isolation and should not be thought of as a collection of boxes (Mareschal et al. 2007, 50).

Studies of adults with language deficits due to focal brain injury such as stroke (called **aphasia**) and functional imaging studies with healthy adults are important for understanding how different regions of the brain are involved in language functioning (for a review, see Hickok and Poeppel 2004). Studies have shown that symptoms of language problems do not always map onto lesion sites in a clear, one-to-one fashion, which suggests that language processing relies on wide networks across the brain, rather than on discrete regions (Dronkers et. and al. 2004). Although left-hemisphere specialization for language is the most typical pattern in adults, it is not observed in all adults. Moreover, right-hemisphere areas have been shown to be important for certain aspects of language processing and language acquisition, and appear to be used to a greater extent in bilingual adults who acquired their second language during early childhood compared with those who were later second-language learners (Hull and Vaid 2007). Thus, although there are differences between bilingual and monolingual individuals in the extent of right-hemisphere involvement in language processing, these appear to be differences in degree. It is not yet clear why there is greater right-hemisphere activation for bilinguals who acquired both

languages early, but it is hypothesized that the effect is linked to the cognitive processes involved in processing two languages early in development (Conboy and Mills 2006).

"Specialization" of Language Functions

- The term *functional specializations for language* refers to the involvement of particular brain regions for particular language tasks but not other tasks. This does not mean that activation is confined to only one area or that separate brain areas operate in isolation of one another.
- Neurons in the left and right hemispheres are involved in language processing, but different neurons are involved in different language functions (e.g., semantics, syntax phonology).
- The extent of right hemisphere involvement in language processing varies for bilingual versus monolingual individuals, and early versus late bilinguals; these differences are hypothesized to be linked to the cognitive processes involved in processing two languages early in development.
- There are differences across bilingual and monolingual children in functional specializations for language, which should not be interpreted as evidence of a delay induced by bilingualism but rather as a distinct developmental pattern linked to experience with each language.

Adult patterns of functional specialization for language are not observed in young children. The functions associated with particular brain areas change during development, and children show a process of moving toward adult patterns of cerebral specialization. For example, unlike adults who sustain brain injury, children who sustain focal brain lesions prenatally or perinatally exhibit significant delays in early language development regardless of whether the lesion was in the left or right hemisphere (Thal et al. 2004). By school age, these children tend to have language test scores in the normal range but continue to show subtle deficits in language (Bates and Roe 2001). These results suggest not only that brain injury disrupts normal language development, but also that children's brains are less specialized than adults' brains (a characteristic known as *plasticity*). The neuroconstructivist framework provides a way of understanding how the infant pattern becomes adult-like. Given that left-hemisphere specialization of language functions has been noted in most adults, there must be an innate bias for left-hemisphere regions to process language. Studies of newborn infants using ERPs, fNIRS, and fMRI have, in fact, indicated that left-hemisphere temporal areas are biased for processing

auditory stimuli that have rapidly changing acoustic information, such as speech sounds (e.g., Dehaene-Lambertz, Hertz-Pannier, and Dubois 2006; Peña et al. 2003). However, an innate bias does not necessarily lead to an adult pattern. The early activity in left-hemisphere regions may be shaped by early experiences and result in the left-hemisphere specialization commonly seen in adults.

The use of different strategies for processing speech sounds throughout development may be one reason that different patterns of functional specialization are observed at different points in development. For example, over the first year, there are shifts in how speech sounds are processed. Behavioral studies, in which participants are trained to provide an overt response such as turning the head when a sound changes, have indicated that infants can distinguish different speech sounds of both their native language and nonnative languages at six to eight months, but only those from their native language at 10 to 12 months (Werker and Tees 1984). This pattern of developmental change linked to language experience has been replicated in numerous behavioral studies and, more recently, in brain-imaging studies (for reviews, see Cheour, Leppanen, and Kraus 2000; Conboy et al. 2008; Fava, Hull, and Bortfield 2011). In the ERP studies, brain discriminatory responses have been measured using an "oddball paradigm" in which an infrequent deviant speech sound (e.g., "ee") is inserted into a stream of frequently repeated standard stimuli (e.g., "ah") (described above). The brain's detection of the change in stimulus is reflected in increases in the amplitude of the neural activity to the deviant versus standard stimulus at a particular point in the time course of processing the sound. That is, the brain responds with more neural activity when it detects a change from the ongoing stream of repeated sounds ("ah-ah-ah-ah-ah-ah") to a new sound ("ee"), which is interspersed into the stream of repeated "ah" once every few seconds in an unpredictable manner. If the brain does not detect the difference in sounds (as when the speech sounds being tested are not from a language the person knows), then no amplitude change will be noted at that point in time, because the neurons that respond to a change are not activated.

Research using ERPs has shown that as infants' perception of native language sounds improves, their ability to distinguish speech sounds from a nonnative language (i.e., ones to which they have not been exposed) declines (Kuhl et al. 2008; Rivera-Gaxiola, Silva-Pereyra, and Kuhl 2005). The decline in the ability to distinguish sounds from a language that the infant is not hearing in his or her daily input may be due in part to the use of general cognitive abilities

that allows him or her to tune out (ignore) irrelevant sounds while tuning into (attending to) relevant ones (Conboy, Sommerville, and Kuhl 2008; Lalonde and Werker 1995). During this same period of development, infants begin making the sounds of their language, a behavior known as "babbling." Data from a MEG study in which an "oddball paradigm" was used to measure discrimination showed that activity in response to speech–sound changes in the left superior-temporal ("Wernicke's") and left inferior-frontal ("Broca's") areas of the brain become coupled between the ages of six and 12 months (Imada et al. 2006). This change possibly reflects the emergence of a functional link between brain areas underlying speech perception (the superior-temporal area) and speech production (the inferior-frontal area). In other words, as infants begin to practice producing speech sounds in their first year, this may change how they perceive speech sounds and lead to the establishment of new neural pathways. The use of different strategies for processing speech sounds may also explain differences in functional specialization and structure that result from various learning situations (e.g., bilingualism versus monolingualism). This last point is considered below.

Changes in the functional specialization of brain activity to different types of words are also noted during early childhood, and have been linked to experience. Mills, Plunkett, Prat, and Schafer (2005) conducted a series of studies in which they recorded the brain activity of monolingual infants of different ages who passively listened to words they understood and to unknown words. Infants as young as nine months showed larger ERP amplitudes to known versus unknown words by 200 milliseconds (ms) after the onset of the word; that is, different neurons fired in response to hearing the words that were familiar. Younger toddlers (13-month-olds to 17-month-olds) showed the effects bilaterally (in both the left and right hemispheres), whereas older toddlers (20-month-olds) showed effects only at electrodes placed at left-hemisphere temporal and parietal sites (for review, see Mills, Conboy, and Paton, 2005). Moreover, toddlers with larger vocabularies showed more focal ERP responses than their same-age peers who had smaller vocabularies, and when toddlers learned new words in meaningful contexts, a more focal response to those words emerged, reflecting that functional specialization emerged with experience with the words (Mills, Plunkett, Prat, and Schafer 2005). These results show how the functional specialization of the brain emerges during development and is linked to experience with language. As with sound processing, such changes may reflect the use of different strategies for word processing, as well as the increasing specialization of particular

forms of processing in neural networks that emerges with increasing experience and skill with language. In the next section we consider evidence from studies of dual language learning infants and children, which have further shown that the brains of DLLs become organized differently from those of monolinguals learners. Most of this research has been conducted with infants and toddlers, who are at the earliest stages of language learning.

Experience and the Functional Specialization of the Brain during Dual Language Learning

Most research on how the young brain responds to language stimuli has been limited to monolingual developmental situations, but recent work increasingly focuses on DLLs. In addition to examining whether there are differences in bilingual and monolingual brains, several ERP studies of infants and young children who are learning more than one language have shed light on how the organization of brain activity changes with language learning. Two types of populations have been studied—those who were learning both languages naturalistically, in which the amounts and/or timing of input varied across children, and those who received short-term exposure to a second language through play sessions conducted in a laboratory setting, in which the amounts of input were controlled across children. In both types of studies, differences in input and experience across languages within the same individuals have allowed researchers to tease apart the effects of language experience and maturation on brain development.

In one study designed to examine functional specializations for word processing, Conboy and Mills (2006) recorded ERPs to known and unknown English and Spanish words from 19- to 22-month-old bilingual toddlers. All of these children were learning English and Spanish simultaneously, but in a variety of ways, and with uneven development across languages. Each child's dominant language was determined by having parents complete a questionnaire regarding exposure to each language across a range of activities and vocabulary checklists on the MacArthur-Bates Communicative Development Inventories (CDI) in English (Fenson et al. 1993) and Spanish (Jackson-Maldonado et al. 2003). ERPs to known and unknown words were compared for each child's dominant and nondominant languages. For both languages, ERP amplitudes were significantly larger for the known versus unknown words, as reported for monolingual infants and toddlers. However, the patterns varied for the same children's dominant and nondominant languages, particularly in the timing and distribution of the effects across the brain. This finding can be explained only by experiential factors, not brain maturation, because

maturation was held constant. For example, there was more rapid processing of words in the bilingual children's dominant versus nondominant language, which may reflect greater word familiarity and ease of lexical access in the dominant language. Unlike monolingual children of the same age, the bilingual toddlers showed effects that were broadly distributed across the brain, rather than limited to left electrode sites. In this sense, the distribution of brain activity of bilingual 19- to 22-month-olds was more similar to that of 13- to 17-month-old monolingual toddlers than it was to that of 20-month-old monolingual toddlers.

Given that the bilingual toddlers knew approximately the same numbers of words in *each* of their languages as the younger monolingual toddlers, the results support the hypothesis that the organization of brain activity for language processing is influenced by toddlers' experience with particular words. This is not evidence that bilingualism hinders or delays early language learning, although it is consistent with other evidence that bilingual lexical learning leads to initially smaller vocabularies in *each separate language* than for monolingual learners of those same languages, and that ***total vocabulary sizes*** (the sum of what children know in both their languages) in bilingual toddlers are similar to those of monolingual toddlers (Pearson, Fernández, Lewedeg, and Oller 1997); for more information on this topic, see Paper 5, Assessment, and Paper 6, Early Intervention and Special Needs. Thus, the differences noted in brain activity across bilingual and monolingual children should not be interpreted as evidence of a delay induced by bilingualism, but rather, as a distinct developmental pattern of specialization linked to experience with each language.

There are many other possible reasons why bilingual children's processing would be different from that of monolingual peers. One is the need to learn and manage conflicting sets of cues for each language. For example, English has many two-syllable words with a stress pattern in which the initial syllable is of longer duration and higher intensity (loudness) than the second syllable (e.g., "mommy"). Initial consonants in English words are thus perceptually salient, or noticeable, because they tend to be louder and longer than other sounds in the word. Because of this saliency, they provide a fairly reliable cue to the beginnings of words in ongoing speech, which helps listeners recognize individual words. This emphasis on the initial parts of words is not as common in all languages. Research that used both behavioral and ERP methods to test infants' recognition of English and Welsh words showed that the stress patterns of each language accounted for distinct results across learners (Vihman et al. 2007). Monolingual Welsh-learning

infants did not show recognition of consonant-initial words at any point between nine and 12 months of age, but monolingual English-learning infants did so by 10 months, reflecting the stronger cues to word onset provided by initial consonants in English compared with Welsh. Bilingual English–Welsh infants recognized both English and Welsh words by 11 months, a pattern intermediate to those of the monolingual infants. Thus, bilingual infants learning English and another language with a different stress pattern (e.g., French, Spanish, Welsh) may temporarily reduce attention to initial consonants in words from both languages. However, this finding does not reflect a delay induced by bilingualism, because the bilingual infants in this study recognized words at an earlier age than did the monolingual Welsh infants. These findings with infants might extend to preschool children who are learning about word onsets during phonological awareness tasks. If there is a difference in the stress patterns of the words in children's two languages, this may temporarily change the cognitive strategies used for processing those words. Thus, the particular pair of languages a child is learning may influence how learning in the two languages interacts. When teaching phonological awareness skills, practitioners should always consider the phonological structure (sequences of sounds, stress patterns) of children's home language and whether it is different from the children's school language.

The processing of words relies on being able to perceive and process speech sounds (phonemes), and the ERP oddball paradigm described above is ideally suited to studying such perceptual skills. The perceptual abilities of bilingual learners may be explained to some extent by relative amounts of experience with each language (Conboy, Jackson-Maldonado, and Kuhl 2009; García-Sierra et al. 2011). For example, García-Sierra and colleagues (2011) presented bilingual infants living in Texas with English and Spanish speech sound contrasts in an ERP oddball paradigm. The infants who heard more English in the home showed a larger discriminatory response for the English than for the Spanish contrast, whereas infants who heard more Spanish at home showed the opposite pattern, and infants with more balanced input across languages showed similar discrimination for each language. Because that study was not designed to directly compare bilingual and monolingual infants, it is not known whether the brain activity of any of the three subgroups resembled more closely that of monolingual infants of the same age. However, when the results from the bilingual infants were compared with the results from a previous study of monolingual infants, it was noted that the younger members of the bilingual

group (six-month-olds to nine-month-olds) did not show exactly the same patterns as monolingual infants of that age. These results suggest that relative amounts of experience with each language correlate with how the brain processes language. This finding is important for practitioners, because it shows that amounts of exposure to each language make a difference in how the brain processes each language.

In sum, although there are some differences between bilingual and monolingual language learning and processing, there are many similarities. Differences between groups have been revealed using cognitive neuroscience methods that are sensitive to the timing and distribution of brain activity. These differences appear to arise from the unique cognitive demands that learning and processing two languages create, such as selectively attending to each language's sound patterns and grammatical rules, inhibiting the retrieval of words in one language when using the other language, and being able to translate and process mixed language input (see the next section and Paper 2, Development Across Domains, for further information). It is important that such differences are not viewed as deficits, but rather, as opportunities for expanding the brain's capacity. At the same time, the slight differences in brain function underscore why monolingual standards are inappropriate for assessing dual language learners (see Paper 5, Assessment). Developmental milestones are achieved at similar ages in dual language learners as in monolingual learners, but might be achieved in slightly different ways. The next section provides examples of some cognitive processes used by bilingual individuals to learn and process language. The research reviewed in this paper has indicated that networks in the brain become established for each language based on experience with that language, and that this process

requires time, as well as rich input in each language.

Differences Are Not Deficits

- There are many similarities between bilingual and monolingual language learning and processing, but there are also some differences. There is evidence that the differences arise from the cognitive demands that learning and processing two languages create for learners, including the need to selectively attend to each language's sound patterns and grammatical rules, to inhibit the retrieval of words in one language when using the other language, to translate, and to process and produce mixed language input.

- It is important that such differences are not viewed as deficits, but rather as opportunities for expanding the brain's capacity.

- Networks in the brain become established for each language based on experience with that language; this process requires time, as well as rich input, in each language. Developmental milestones are achieved at similar ages in DLLs as in monolingual learners, but might be achieved in slightly different ways.

Involvement of Different Cognitive Processes in Dual- Versus Single-Language Learning and Use

The unique challenges faced by bilingual speakers lead them to process information in ways that are different from those of monolinguals. In addition to sorting out conflicting cues to speech sounds, word structure, and sentence structure, bilingual speakers frequently process language under mixed-language conditions (i.e., hearing words from both languages mixed into the same sentence or conversation). Enhanced functioning on nonlinguistic tasks that require executive functions, such as working memory, inhibitory control, and the ability to control attention to relevant versus irrelevant cues, is seen in bilingual individuals as young as preschool and kindergarten age (e.g., Carlson and Meltzoff 2008) and as old as later adulthood (Bialystok et al. 2004). The attentional skills of infants are also influenced by dual language experience (Kovács and Mehler 2009). Thus the cognitive demands of managing two languages may sharpen abilities in other domains, and these enhanced cognitive abilities may be used to further process and learn language (see Paper 2, Development Across Domains, for a review of the most relevant findings for preschool-age DLLs). Shafer, Yu, and Datta (2011) used ERPs to directly compare the speech sound discrimination skills of bilingual and monolingual infants and young children learning English and Spanish in New York City. Children were tested on two speech

sounds (vowels) that are found in English but not in Spanish. The ERPs showed discrimination, but the effects varied by age and language experience (monolingual versus bilingual). In particular, there was evidence that the bilingual infants had higher levels of attention while processing the speech sounds. A follow-up study confirmed this hypothesis (Shafer, Yu, and Garrido-Nag 2012). Enhanced attention during speech processing might be thought of as an adaptive strategy, brought on by bilingualism, and it might be one that allows children growing up with two languages from birth with the ability to keep pace with their monolingual peers in achieving developmental milestones in language.

In the research on bilingual toddlers conducted by Conboy and Mills (2006) described above, children showed more enhanced neural activity at right-hemisphere versus left-hemisphere frontal electrode sites while processing words in their dominant language, but this pattern was observed only in toddlers who were tested in a condition in which words were randomly switched between English and Spanish. A group of bilingual toddlers tested in a condition in which words were presented separately for each language did not show the larger effect at right frontal sites, and there was evidence that they processed words more quickly. In other respects, their ERP patterns resembled those of the bilingual toddlers tested in the language-switching condition. Thus, the increased cognitive load imposed by switching between languages may have recruited additional neural tissue and required additional processing time. A follow-up study of the Conboy and Mills (2006) study using a different analysis method showed that brain activity in a frequency band known as **theta** (between 4 and 8 Hz)—which is linked to effortful processing—differed for children tested in the language-switching and in the single-language conditions (Bosseler, Conboy, and Mills 2012). These results support the hypothesis that different cognitive functions are involved in processing words across such conditions, though further research is needed to understand what those functions are.

Kuipers and Thierry (2011) studied two- and three-year-old bilingual and monolingual children growing up in Wales in order to determine whether there were differences in how the two groups processed switches between languages. The children were presented with a picture, and then heard a word that matched or did not match the picture. The bilingual children were faster than their monolingual peers at detecting when the language of word presentation switched from one language to the other, suggesting that they had developed a switching-detection device. The bilingual children showed an ERP effect (larger positivity) to the switch within the first

300 ms after the onset of the word onset, a time window associated with phonological analysis, while the monolingual children of the same age did not show an effect until after 300 ms, a time window associated with lexical-semantic analysis. Kuipers and Thierry (2011) interpreted the earlier effect as a particular bilingual language-change detection response that developed only in the bilinguals, and the later effect as a response to word familiarity/meaning that developed in both populations.

More research is needed to understand how different cognitive functions are used in bilingual versus monolingual language processing. What the research suggests is that different brain tissue is recruited in bilingual children, as an adaptation to the task of managing two languages. Although practitioners may view the use of additional cognitive strategies as a negative aspect of bilingualism, it may be viewed as a positive adaptation that can enhance other aspects of learning (see Paper 2, Development Across Domains, for more information).

Second Language Learning: Is Early Always Better?

It is widely believed that language learning is optimal during the early years of life and that a language is best learned within this early period. According to the "critical period hypothesis," acquisition of a language must begin early in life in order for it to occur normally. There is, indeed, evidence that supports the idea of a sensitive or "critical" period for first-language acquisition (Mayberry and Lock 2003; though see Bruer 2008 for a challenge to the use of the term *critical period* regarding language acquisition). For example, Mayberry and her colleagues have investigated sign-language acquisition in individuals who were born deaf and deprived of early language input because their deafness was not initially discovered, or because opportunities to interact with a community of sign language users were not available (Boudreault and Mayberry 2006; Mayberry 1993; Mayberry and Lock 2003). This line of research has revealed that delays in exposure to a first language in early childhood are associated with a reduced ability to attain high levels of proficiency in that language. Moreover, Mayberry, Lock, and Kazmi (2002) found that individuals who had exposure to either a signed or a spoken language early in life attained higher levels of proficiency in a second language (signed or spoken) than those who had not had early experience in any language. Thus, early exposure to a first language, in either the spoken or signed modality, is not only crucial for successful first-language acquisition, but also lays down a foundation for successful second-language

acquisition. However, in individuals who have had early exposure to a first language, it is not clear whether exposure to the second language also must occur early in life for full proficiency to be attained in that language—that is, whether there is a sensitive or critical period for second-language acquisition (Hakuta 2001).

Although research findings suggest that individuals who acquire a second language in later childhood or adulthood seldom acquire it with full proficiency, researchers do not agree that the interpretation of such data is that there is a critical period for second-language acquisition. That is, age-of-acquisition (AoA) effects are open to more than one interpretation (see the next section). Unfortunately, misconceptions about sensitive or critical periods for language acquisition have sometimes been used to support practices and policies on DLLs in the United States (Crawford 1999). Advocates of English-only educational approaches with culturally and linguistically diverse students in the United States have argued that "The critical age hypothesis for second language acquisition has long been recognized by linguists, i.e., that the optimal time to learn a second language is between age three and five or as soon thereafter as possible, and certainly before the onset of puberty" (Porter 1988), and that "Young immigrant children can easily acquire full fluency in a new language, such as English, if they are heavily exposed to that language in the classroom at an early age" (English Language in Public Schools Initiative Statute 1998). These arguments not only assume that the optimal time to learn a second language has been established scientifically, but also suggest that the use of bilingual educational approaches delays the onset of English learning, when, on the contrary, children in transitional bilingual education programs have been shown to benefit from learning academic content in their home language at the same time that they are developing English skills (Krashen and McField 2005). It is important that practitioners know about research findings on AoA effects for second-language learning and understand the possible sources of these effects, so that they make informed decisions about first and second language use in the classroom and give sound advice to parents regarding home-language use (see Paper 3, Program Elements and Teaching Practices, for additional information).

Several "long-term attainment studies," in which adults who started learning their second language at different ages were tested on their proficiency in that language, have shown AoA effects on participants' long-term attainment of the second language. These studies have shown that the earlier the individuals began learning the second language, the higher the level of

proficiency they ultimately attained in that language, as observed in their ability to detect grammatical violations (e.g., Birdsong and Molis 2001; Jia, Aaronson, and Wu 2002; Johnson and Newport 1989), discriminate speech sound differences (e.g., Flege, Yeni-Komshian, and Liu 1999), and produce second-language speech sounds (e.g., Jia et al. 2006). In a few studies, participants who were exposed to the second language before or around six years of age showed native-level performance in all of these areas. That is, there is no evidence from this research that the window of opportunity to become a strong second-language user abruptly closes any time before the age of six years. It has also been shown that there is not any abrupt moment in time when the window of opportunity closes, even beyond the age of six years; instead, there is a gradual decline with increasing age of acquisition throughout childhood and adolescence (e.g., Birdsong and Molis 2001; Hakuta, Bialystok, and Wiley 2003). It is important for practitioners to recognize that research on AoA effects has been correlational, rather than experimental, in nature. In **correlational research,** other factors that can lead to a change in the variable of interest are not controlled, as is done in **experimental research.** Thus, it is possible that the higher levels of second-language proficiency achieved by earlier versus later learners may be due to some other factor than AoA.

Neuroscientific methods have also been used to examine differences in brain function and structure across individuals who have learned a second language at different ages. In the functional imaging research, even small delays in the onset of second-language acquisition (i.e., one to three years) have been linked to the patterns of brain activity for processing that language (Weber-Fox and Neville 1996). Again, it is important to realize that, in many of these neuroscientific studies, experiential factors, such as frequency of use of a language, have been confounded with the age of first exposure to that language. Several studies have indicated that proficiency in the second language, as well as the age at which the language was acquired, affect patterns of brain activity (e.g., Perani et al. 2003). The influence of language proficiency on the brain was demonstrated most profoundly in a study by Mechelli and others (2004), in which structural magnetic resonance imaging was used to examine gray matter volumes in the cortex. Gray matter density in one area of the cerebral cortex—the inferior parietal area—was greater in bilingual adults compared with monolingual adults, greater for individuals who had learned their second language earlier (prior to the age of five years), and greatest for those individuals most proficient in their second language. Moreover, differences in brain function for the first and

second languages have been noted even when the second language was acquired before the age of five years (Conboy and Mills 2006; Kovelman, Baker, and Petitto 2008; Perani et al. 2003; Wartenburger et al. 2003).

There is a limited amount of neural imaging research on bilingualism or second-language processing in children older than infants and toddlers, and most of that work has been conducted with older children. In an fMRI study of word processing in seven- to 11-year-old bilingual children with high levels of proficiency in both languages, there were no differences in activation patterns across the two languages, even for the children who acquired their second language after the age of three years (Mondt et al. 2009). In an fMRI study of 13-year-old Japanese twins, the processing of second-language verb forms occurred in the same left frontal cortical areas as for processing first-language verb forms, after only two months of second-language exposure in a classroom setting (Sakai et al. 2004). Moreover, second-language performance was highly similar in twin pairs, suggesting that both shared genetic and shared environmental factors are involved in determining the neural correlates of second-language learning. There was similar neural activity for the second language as for the first language, even at the beginning stages of second-language acquisition, when performance was not native-like, and even when second-language learning began in adolescence. This finding calls into question the notion that later second-language acquisition cannot occur through the recruitment of the same brain areas as first-language acquisition and use. In another fMRI study, Tatsuno and Sakai (2005) compared two groups of adolescents, ages 13 and 19, on a past-tense verb identification task in their first language (Japanese) and their second language (English), which was acquired after the age of 12 years. The groups showed similar activation in a left-hemisphere language region for the first language, but different activation levels for the second language, which were linked to proficiency levels. In the older group, who had achieved proficiency with English past-tense forms, there was greatly reduced activation, suggesting less effortful processing with increased proficiency.

Archila-Suerte, Zevin, Ramos, and Hernández (2012) reported fMRI evidence for the use of different brain processes during a speech perception task in six- to 10-year-old monolingual children and bilingual children the same age who had begun to learn their second language between four and nine years of age. The bilingual children recruited areas of the brain involved in executive function (cognitive control) to a greater extent than did the monolingual children,

but only when processing their second language. This finding supports the idea that some AoA effects are caused by the use of different cognitive processes.

Is There a Critical Period for Language Learning?

- It is undisputed that early exposure to a first language is crucial for successful first-language acquisition and lays a foundation in the brain for successful second-language acquisition. However, for individuals who have had early exposure to a first language, it is not clear whether exposure to a second language also *must* occur early in life for full proficiency to be attained in that language.

- Although individuals who acquire a second language in later childhood or adulthood seldom acquire it with full proficiency, scientists do not agree that the interpretation of such data is that there is a critical period for second-language acquisition. Some scientists argue that complete mastery of a second language occurs only when exposure to the language begins in early childhood, before certain brain structures have matured (i.e., that there is a critical period for second-language acquisition). Other scientists propose that, rather than brain maturation, experiential and/or cognitive factors frequently limit the learning of the second language (i.e., a second language can be learned at any age, given the appropriate experiences and cognitive factors).

Interpretations of Age-of-Acquisition (AoA) Effects

The above-mentioned AoA effects noted in both brain and behavioral research have been explained by different accounts. Some argue that AoA effects provide evidence that there is a critical period for the acquisition of second (and subsequent) languages, and that complete mastery of a language occurs only when exposure to the language begins in early childhood, before certain brain structures have matured (e.g., Johnson and Newport 1989). In contrast, others propose that rather than brain maturation, experiential and/or cognitive factors are the major causes of AoA phenomena (e.g., Archila-Suerte et al. 2012; Bialystok and Hakuta 1998; Elman et al. 1996; Marinova-Todd, Marshall, and Snow 2001). Evidence has been mounting to support the latter claim. One line of evidence that supports an experiential account comes from a five-year longitudinal study in which researchers documented changes in the language proficiency and use of 10 native Chinese-speaking children who immigrated to the United States between five and 16 years of age (Jia and Aaronson 2003). It was found that younger and older children went through different second-language learning processes. The younger children

quickly switched to English as their main language due to a sense of peer pressure, a desire to fit in, and because their first language was not yet developed. In contrast, the older children sought out peers of the same home language and culture and continued to use a large amount of the home language. Throughout the five years of the study, the younger children experienced a significantly richer second-language environment than the older children did. These findings support an experiential account in explaining the seemingly greater challenge in second-language learning encountered by older learners.

Another body of studies on AoA effects on second-language acquisition has examined first-language, as well as second-language, proficiency. Studies adopting this approach have consistently found that individuals who begin to learn their second language in early childhood become more proficient in their second language than in their first language, whereas older learners show the opposite pattern, maintaining the first language as their dominant language. Such trends have been found for the accuracy of pronunciation of Korean–English bilinguals (Yeni-Komshian, Flege, and Liu 2000), as well as for the speed and accuracy of lexical retrieval of Spanish–English bilinguals (Kohnert, Bates, and Hernández 1999) and of Russian–English bilinguals (McElree, Jia, and Litvak 2000).

When considering potential critical-period effects on second-language acquisition, practitioners need to look at the long-term outcomes of those effects and consider children's experiences with both of their languages, instead of focusing only on whether second-language performance matches that of native speakers. Research has found AoA effects for particular aspects of language, such as speech-sound pronunciation and perception (phonology) and grammar (**morphology** and **syntax**), but not meaning-related aspects of language (e.g., vocabulary learning). In fact, several studies have shown that older learners are faster at learning vocabulary than are younger learners (Marinova-Todd, Marshall, and Snow 2001). Practitioners need to consider whether the effects on phonology and grammar noted in later second-language learners are important in the long run, especially in terms of educational outcomes. Jia and Aronson (2003) found that young adults who were older at the time of arrival in the country of the second language made more morphological errors in that language than those who had arrived in the country earlier in childhood, but were equally strong academically. In another study of college students from Spanish–English bilingual backgrounds, Jia, Alvarez, and Pantin

(N.d.) found that morphological ability in English had only a weak correlation with students' grade-point average.

The Effects of Language Learning on the Brain Facilitate and Constrain Further Learning

For an age-related decline in acquisition ability to be called a critical-period effect, there must exist specific moments in time when the window of opportunity for learning opens and closes (see Bruer 2008). Because there is, instead, evidence of a gradual reduction in second-language learning ability with age, several researchers have argued that AoA effects should not be interpreted as critical-period effects (Bialystok and Hakuta 1994). The neuroconstructivist framework provides an alternative model for thinking about the source of such gradual reductions, which is that learning and development constrain future learning.

One way to think about how learning constrains future learning is by considering the phenomenon of **perceptual narrowing,** which is noted across several domains of young children's development. Werker and Tees (1984), and other subsequent research (for a review, see Conboy et al. 2008), have shown that infants undergo a process of perceptual narrowing in speech perception during the end of their first year, and this is reflected by how well they process differences between speech sounds from their native language versus those from an unfamiliar nonnative language. Kuhl et al. (2005) have further suggested a functional link between perception of native and nonnative language sounds. As described above, infants vary in their ability to detect native and nonnative sound differences when tested at seven and one-half months of age, an age at which infants typically begin to fail to discriminate nonnative sounds. Using a conditioned head-turning test, in which infants are trained to turn their heads in one direction when they detect a change in a speech sound, Kuhl and her colleagues (2005) found that those infants who had better native-language perception also had worse nonnative sound perception at this age, and those same infants had better native-language vocabulary skills several months later, when compared with infants who had the opposite profile at seven and one-half months (i.e., worse native language perception and better nonnative language perception). This finding was subsequently replicated using an ERP oddball paradigm (Kuhl et al. 2008). The findings suggest that perceptual narrowing involves a process of **neural commitment** to the native language, which leads infants to ignore particular features that are not relevant to the native language, and results in making a nonnative language more difficult to acquire with increasing age. A similar concept is that of **entrenchment**, which is the idea that once a learner's

neural networks become entrenched in responding to linguistic cues (e.g., sound patterns or grammatical rules), they become less able to accommodate conflicting cues (see Elman 1993; Elman et al. 1996; Fava, Hull, and Bortfeld 2011).

It is important to consider the time frame in which processes such as perceptual narrowing, neural commitment, and entrenchment constrain learning, and to consider whether such constraints are immutable. It would be expected that children who are exposed to a second language after such narrowing has occurred would have difficulty learning the language or that the effects of narrowing would lead to learning that is less than optimal. This hypothesis was tested in two studies by Kuhl and her colleagues. In the first study, Kuhl, Tsao, and Liu (2003) provided infants (ages nine to 10 months) from monolingual English-speaking homes with Mandarin Chinese exposure in a laboratory setting. The infants interacted with native adult speakers of Mandarin during 12 25-minute sessions, or watched and/or listened to those same speakers on video recordings for the same amount of time. Across all of the conditions, the speakers used naturalistic, infant-directed styles of speech and the same toys and books, to ensure uniformity of exposure to the language across infants. After the sessions, the infants were tested on their discrimination of two Mandarin speech sounds, using a head-turning procedure. The infants who received live, naturalistic exposure to the language discriminated the sounds, and their performance was similar to that of a comparison group of infants being raised in Mandarin-speaking homes in Taiwan. The infants who watched or listened to the videos did not discriminate the Mandarin speech sounds and performed at a level similar to that of a control group who received play sessions conducted in English (and hence did not have exposure to Mandarin). In a follow-up study, Conboy and Kuhl (2011) provided a group of infants, ages nine and one-half months to 10 and one-half months, from monolingual English-speaking homes, with live, naturalistic exposure to Spanish. The infants were tested before, as well as after, the 12 exposure sessions, and the researchers used an ERP oddball paradigm to test discrimination of two Spanish speech sounds. The infants showed changes in the ERPs to both the Spanish speech sounds and to a pair of English speech sounds, from pre-test to post-test. For both languages, the neural correlates of speech-sound discrimination (a difference in the ERPs to the infrequently presented deviant sound and the frequently presented standard sound) showed improvements in discrimination. A discriminatory response that was not present for the Spanish sounds when the infants were nine months old was noted when they were 11 months old. For English, the

discriminatory response was present at both ages, but it was enhanced (larger in size and with an earlier onset) at 11 months compared with nine months.

There are four important points to consider from the above-mentioned research. The first is that, if perceptual narrowing and neural commitment to the native language are the sources of AoA effects in second-language acquisition, at least with regard to **phonology**, then this process is not immutable. The tuning out of nonnative speech sounds must be reversible, if infants can develop the same neural discriminatory responses for nonnative speech contrasts as for native speech contrasts after only a small amount of naturalistic exposure to that nonnative language. Other studies in which an ERP oddball paradigm was used with children learning a second language in classroom settings have also shown a similar neural discriminatory response to second-language speech sounds emerging at three to six years of age (Cheour et al. 2002; Rinker et al. 2010; Shestakova et al. 2003). Thus, neural commitment does not completely hinder new phonological learning in children, even during the early school years. In other words, the brain's increasing specialization for processing the first language during early childhood does not necessarily limit its ability to learn another language. Because the brain is not a limited capacity system, it can accommodate the learning of new information. The fact that synaptic pruning occurs during the same period when the brain becomes neurally committed to processing the native language(s) does not necessarily lead to the conclusion that the ability to learn a nonnative language is present only prior to neural commitment.

The second important point from the Kuhl, Tsao, and Liu (2003) and Conboy and Kuhl (2011) studies is that native language processing in early development was not adversely affected by exposure to another language. Infants continued to discriminate their first-language sounds while learning second-language sounds, a finding that is consistent with the research on speech-sound discrimination in bilingual infants reviewed above. Again, these findings suggest that the brain is not limited in its capacity to learn multiple languages. However, there is some evidence that infants who have been raised bilingually from birth might not undergo the process of perceptual narrowing in exactly the same ways as monolingual infants. A functional NIRS study demonstrated that 10- to 12-month-old bilingual infants did not show perceptual narrowing for nonnative sounds (i.e., speech sounds from a third language that were not from either of their two native languages [Petitto et al. 2011]). This finding provides evidence that infants growing up with two first languages do not show neural commitment in the form of perceptual narrowing

in the same ways as monolingual infants. The bilingual infants adapt their processing in ways that are beneficial for bilingualism (what Petitto and her colleagues suggest is a "perceptual wedge" that allows bilingual infants' systems to remain more "open" to multiple linguistic cues).

Third, the Kuhl, Tsao, and Liu (2003) study highlighted the importance of social interaction for language learning, and a follow-up study has indicated that the degree to which individual infants socially engage with adults who speak to them in the second language, as measured by the infants' shared eye gaze with those adults, is associated with the infants' second language perceptual learning (Conboy et al. N.d.). Thus, these results are consistent with the view that infants and young children succeed in learning the phonology of a second language when they are socially engaged with speakers of that language. The studies with infants may be of interest to preschool teachers, because the studies indicate what neural, social, and cognitive mechanisms might be involved in aspects of learning and processing a second language.

In sum, the research suggests that many AoA related brain phenomena may be due to relative language proficiency, frequency of use of each language, and social and cognitive factors, rather than critical-period effects.

Recommendations and Implications for Program Practice

Given the research showing that measures of brain activity reflect the varying experiences children raised in bilingual environments have with each of their languages, practitioners should realize that DLLs will not exactly resemble monolingual children in each of their languages. Therefore, monolingual assessment standards should not be used with DLLs (for more on the topic of assessment, see Paper 5, Assessment). Although differences in how bilingual brains process language are not signs of deficit, the differences point to several instances where a DLL would appear deficient if assessed using monolingual norms. For example, bilingual children tend to have vocabulary knowledge distributed across both their languages, thus they do not always know the same words in both languages. It is typical for young bilingual children to know many different types of words (such as nouns, verbs, and adjectives) in the more dominant language, while knowing fewer word types in the other language (Conboy and Thal 2006). Given this distributed nature of bilingual language development, bilingual children might not be equally ready to learn the same things in each of their languages at particular moments in time. The research reviewed in this paper has indicated that networks in the brain become established for

each language based on experience with that language, and this process requires time, as well as rich input in each language. As brain measures have indicated, bilingual children are often more efficient at processing their stronger language than their other language, and this processing efficiency could affect the learning of more advanced language skills in each respective language.

Practitioners should also consider that nothing about neuroscience research indicates that the brain is a limited capacity system. Learning—in the form of new connections between neurons—occurs throughout the lifetime. Young children can successfully learn two languages and do not need to give up their home language in order to learn English if it is the formal language of the preschool setting. Practitioners can enhance the language learning of DLLs by providing rich learning opportunities in each language. For example, they may support the home language at the same time as the school language through family involvement, bilingual materials, and activities and interactions in the home language with teachers, staff members, and peers who speak that language.

Although bilingual learners share many characteristics of language development with monolingual learners of each of the same languages, differences across groups have been noted for various aspects of how the brain processes language. For example, there is evidence that both languages are activated for the same concept, so that a bilingual speaker needs to select from a wider range of words than a monolingual speaker to retrieve the correct word, and therefore use cognitive (executive) control mechanisms to a greater extent than in monolingual word retrieval (for more information, see Paper 2, Development Across Domains). There is limited evidence regarding how the bilingual lexicon is organized in children, but evidence from studies reviewed in this paper has suggested a greater use of attentional control processes than during monolingual processing. This difference is noted as early as seven months of age, even before vocabulary is developed, and is therefore probably induced by the need for bilingual children to pay attention to different cues across languages. Thus, differences in the brain areas used for dual versus monolingual language processing should not be interpreted as delays or deficits; instead, they should be viewed as adaptations to the need for using additional cognitive resources. In fact, many of the differences in cognitive control functions across bilingual and monolingual individuals may be construed as bilingual advantages. Such advantages might be made accessible to all children through various degrees of bilingual programming.

The fact that the brain adapts to bilingual input should also be considered by practitioners when they advise parents and teachers about how to talk to DLLs. For example, as seen in ERP studies reviewed in this paper, the bilingual brain becomes adapted to process code-switching (the use of both languages within the same conversation or even within the same sentence) by as early as three years of age (see Paper 2, Development Across Domains, for a more detailed discussion of code-switching). Thus, parents and teachers should not worry that the use of both languages will confuse a child or create a developmental delay. Instead, caregivers should understand that young DLLs' developing brains are capable of processing as well as producing two languages. Parents and teachers should be advised that children need rich input in both languages and need to be able to practice using both languages.

The research also suggests that, because experience shapes children's learning mechanisms, models of learning need to reflect that bilingual children may learn differently from monolingual children. For example, monolingual models do not account for the fact that the DLL needs to discover different sound systems, stress patterns in words, and grammatical rules. Although there is no evidence that DLLs become confused by learning different sets of language rules, practitioners should recognize that language systems interact during processing. Although these differences may affect performance on tests, they do not necessarily indicate a delay or deficit.

Consumers of cognitive neuroscience research must remember that the field is in its infancy. Further research is needed to understand how individual differences across children in first-language development and brain organization relate to individual differences in second-language learning and processing. Research is also needed to determine the influence of the degree of bilingualism (i.e., relative balance in exposure and rates of learning) and language dominance on brain development. It is already known that brain activity is associated with these variables, but more research is needed to understand the causal relationships involved. In particular, it is important for the field to understand to what extent even small amounts of experience with a second language change the brain; some evidence reviewed in this paper suggests that brain changes can be noted after relatively little experience and without apparent detriment to first-language processing. Practitioners need to be careful not to generalize the limited results on DLLs in the cognitive neuroscience literature to all DLLs, because it is not known how the similarity of a learner's two languages to each other affects learning. Neural imaging methods, such as ERP, MEG, fMRI and fNIRS, will facilitate study of the cognitive mechanisms

employed for those aspects of language processing that are unique to bilingualism or multilingualism (language control, switching, and translation).

Research regarding the optimal timing of second-language learning is also needed. Although it is assumed that earlier is better for second-language acquisition, more studies that carefully control for the length and the quality of exposure are needed before important programmatic decisions are made regarding when to introduce a second language. It is possible that environmental and social variables, including children's attitudes toward their peer groups, are stronger influences on language learning than the timing of exposure, yet these variables are often confounded in studies. If earlier exposure to a second language results in the loss of a home language, the child's learning might not necessarily be enhanced, because the cognitive advantages of bilingualism will be lost. At the same time, caution must be taken not to overgeneralize and misinterpret findings in an effort to stimulate brain development at ages when **plasticity** is believed to be greatest, in an effort to gain cognitive advantages. For example, parents do not need to purchase special videos or other products to teach a language to their infants or very young children in order to ensure that the language is acquired prior to the school years; research shows that children can learn a second language when it is introduced in the early school years. Language learning requires social contexts, whether at home or at school. Video materials for teaching language should not be considered a replacement for social contexts. Instead, parents should consider that the preschool setting could provide opportunities for their children to be introduced to a second language in a social context.

Prospective studies of the development of brain structure and function in children as they acquire two languages would be particularly useful for informing policies about how to structure preschool programs. Such studies would shed light on how experiential factors influence the organization of two different languages within the same brains over time. For example, researchers might compare how different formats for teaching a second language in preschool result in processing efficiency, the use of different cognitive processes, and so forth. It is not known whether certain social contexts, formal versus informal instruction, the use of different languages by different teachers or both languages by the same teacher, and so forth, result in optimal brain organization for bilingual language function. Finally, studies that carefully control for cultural influences on brain and cognitive development are needed. Socioeconomic status and culture are closely linked, and both have been shown to influence cognitive development (e.g.

Rogoff et al. 2003). Whether these factors mediate the effects of bilingualism on brain development remains to be discovered, as most studies of early bilingualism have not carefully controlled for these variables.

In summary, educators and other practitioners who work with young DLLs should become critical consumers of research produced in the burgeoning fields of developmental cognitive neuroscience and educational neuroscience. Such research has already begun to shed light on the nature of bilingual processing in infants and young children. This line of research has the potential to inform best practices with DLLs, by showing whether certain practices result in more optimal outcomes than others. At the same time, practitioners should be careful not to overinterpret or overgeneralize limited findings.

Glossary

absolute functionality. Term used by Clancy and Finlay (2001) to describe whether a neural structure or region is physiologically capable of performing its function (contrasts with "task-specific functionality").

aphasia. An acquired language disorder, usually brought on by structural damage to areas of the cerebral cortex.

axons. Extensions that project from the cell body of a neuron and carry neural activity to other neurons by transmitting chemoelectrical signals

cerebral cortex. The outermost layers of neural tissue of the cerebrum, most important for language and cognitive functions in humans.

correlational research. A form of research in which variables are measured and systematic relationships between them are tested using statistical methods.

dendrites. Branch-like extensions that project from the cell body of a neuron and receive activity from the axons of other neurons via the transmission of chemoelectrical signals.

entrenchment. Term used by Elman, Bates, Johnson, Karmiloff-Smith, Parisi, and Plunkett (1996) to describe the process by which neurons become involved in particular cognitive processes.

experimental research. A form of research in which one variable is manipulated in a controlled fashion and its effects on one or more other variables are measured and tested using statistical methods.

functional specializations for language. A term sometimes used to describe the fact that particular brain regions (or neural networks) are uniquely involved in particular language tasks, but not other tasks.

glial cells. Nonneuronal cells that provide support for neurons or form myelin.

Hebbian learning. First proposed by Donald Hebb (1949), this term refers to the process by which connections between neurons at the synaptic juncture are strengthened with repeated activity.

hippocampus. An area of the cerebral cortex, located underneath the cortical surface in the medial temporal lobe in humans and other primates; it plays an important role in long-term memory formation.

in utero. A Latin term meaning "in the womb," used to describe the prenatal state of an embryo or fetus.

morphology. In linguistics, refers to the structure of word forms and rules for using those structures.

myelin. Insulating material that forms a fatty layer (myelin sheath) around the axon of a neuron; is made up of glial cells.

myelination. The process by which axons become insulated by myelin sheaths.

neural commitment. Term used by Kuhl and her colleagues (2008) to describe the process by which neurons become involved in particular cognitive processes.

neuroconstructivism. A theoretical approach used in developmental psychology to explain how the brain becomes specialized for particular cognitive and linguistic functions; emphasizes gene-environment interactions and plasticity of the brain.

neuroconstructivist. Of or pertaining to *neurocontructivism.*

neurogenesis. The process by which neurons are born (generated from neural progenitor cells in proliferative zones).

neurons. Nerve or brain cells that process and transmit information through chemoelectrical signals.

neurotransmitters. Chemicals that transmit signals across a synapse between neurons and target cells.

onset. Beginning.

perceptual narrowing. A term used in developmental psychology to describe the processes by which environmental experiences shape the brain's perceptual abilities (e.g., an infant's experience with a native language leads to a favoring of perception of native language speech sounds over nonnative language sounds).

phonology. In linguistics, refers to the systematic organization of speech sound patterns in a language.

plasticity. Also known as *neuroplasticity*; refers to the properties of neural structures and connections that allow them to change in response to changes in the environment and/or injury.

probabilistic epigenesis. Term used by Gottlieb (2007) to describe the view that there are bidirectional influences between genes, neural development, behavior, and the environment.

programmed cell death. The death of a cell that is regulated by an intracellular program.

progressive events. Term used to describe the additive events of brain development (formation of new structures; contrast with *regressive events*).

proliferative zones. Regions of the brain where neurogenesis takes place.

regressive events. Term used to describe the eliminative events of brain development (elimination of structures; contrast with *progressive events*).

semantics. In linguistics, refers to the relationships between forms of language (e.g., words, phrases, signs) and their meanings.

synapse. A connection between cells in the nervous system at which chemoelectrical signals are transmitted.

synaptic pruning. The process by which synapses between neurons are eliminated in development, leaving more efficient neural pathways.

synaptogenesis. The formation of new synapses.

syntax. In linguistics, refers to the principles or rules by which sentences are constructed.

task-specific functionality. Term used by Clancy and Finlay (2001) to describe whether a neural structure or region is not only physiologically capable of performing its function, but has also become recruited and activated for a given task (contrasts with *absolute functionality*)

thalamus. Region of the brain below the cerebral cortex that receives and relays input from sensory and motor systems to the cortex.

theta. A low-frequency rhythmic pattern of brain activity (between 4 and 8 Hz, or cycles per second), seen in electroencephalogram (EEG) recordings of humans.

total vocabulary size. A measurement of word learning skills in dual language learners, which involves summing together the number of words a child says in each of his or her two languages.

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Paper 2

Cognitive Consequences of Dual Language Learning: Cognitive Function, Language and Literacy, Science and Mathematics, and Social–Emotional Development

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The term *cognition* describes a broad range of processes that can generally be understood as processes involved in thinking or acquiring knowledge. Cognition may refer to higher-level acts of thinking, such as problem solving, reasoning, decision making, or reading, but cognition also refers to more basic components of thinking, including memory, perception, planning, and language. Typically, development in one area of cognition affects other areas of cognition. For example, as children's planning skills increase, they are better able to solve multistep problems because they can plan what their next steps should be. And as children begin to be able to understand words and communicate through language, they gain an important means for acquiring new knowledge. Several research studies have found that speakers of particular languages (e.g., speakers of English versus speakers of German) think and act on various aspects of the world in ways that can be traced to specific ways the particular languages describe the world. More recently, scientists have begun to examine how learning multiple languages versus learning only one language affects cognition.

What are the cognitive consequences of learning multiple languages early in life? The possibility that dual language learning[1] may affect children's language and cognitive development has been an ongoing concern for parents and educators. Recent research has identified several areas in which dual language learning has positive effects on cognitive development as well as areas where dual language learning has either no or deleterious effects on development. Overall, research indicates that learning and speaking more than one language bequeaths a cognitive advantage in a variety of tasks that is detectable as early as seven months of age (Kovacs and Mehler 2009), persists throughout childhood to adulthood, and even offers some protection against symptoms of Alzheimer's dementia (Craik, Bialystok, and Freedman 2010). In general, dual language learners (DLLs) have been shown to have enhancements in many areas of cognition (e.g., executive control, many aspects of language and literacy, and aspects of social emotional development) but show less-advanced performance in some tasks (e.g., tasks where words need to be retrieved quickly) and may have smaller vocabularies when each language is considered independently. Moreover, effects of dual language learning may

1. Although we use the term *dual language learning* here, there are various other terms and distinctions made in the literature, including *bilingual, multilingual, crib bilingual, simultaneous bilingual, sequential bilingual,* and *English language learner.* These distinctions may matter in particular studies. For example, some studies find different effects for children who have been learning two languages since birth versus children who have had only brief experiences in an immersion setting. In this paper, when we talk about the methods and results of individual studies, we use the terminology used in the study, but we use *dual language learning* as an umbrella term that encompasses all the variations of learning two (or more) languages.

depend on the specific languages being learned. For example, advantages from dual language learning for tasks such as sounding out words when learning to read may depend on which two languages a child is learning. In this paper, we summarize the current research on the cognitive consequences of being a DLL. We begin by describing research on how dual language learning affects general cognitive function, including executive control and memory. We also examine how dual language learning affects areas of learning that have a strong cognitive component: language and literacy, mathematics, science, and social–emotional development. The length of each section in this paper related to the topics listed above reflects the state of research on each of these topics. The topics related to general cognitive function (including executive control and memory), as well as language and literacy, are addressed in greater detail in this paper because there are many studies in these areas. To date, there has been limited research on how learning in one or more languages relates to learning in mathematics, science, and social–emotional development (areas of learning that have a strong cognitive component).

Historical Research on Dual Language Learning

Parents and educators have long been concerned about whether learning multiple languages affects children's language and cognitive development. In the early 1900s, the prevailing view was that dual language learning was confusing for children and interfered with cognitive development.[2] Part of this was due to some appalling missteps. For example, at the end of World War I, new arrivals to Ellis Island were administered intelligence quotient (IQ) tests in English. Mostly because of their limited English proficiency, the immigrants performed poorly on the test and were declared mentally deficient. Moreover, the results of these tests were inappropriately used to make sweeping and inaccurate generalizations about entire populations who shared racial, ethnic, or national origins (Bialystok 2010; Gould 1981).

Research from the 1950s seemed to indicate that children learning two languages acquired language more slowly than monolingual children and achieved smaller vocabularies, but oftentimes vocabulary was measured only in English, and a spate of other variables co-occurred with language status, including socioeconomic status (SES) and schooling. In more recent studies when such variables are controlled for, no differences are found between bilinguals and monolinguals (Bialystok 2010; Romaine 2004). This finding suggests that SES and schooling, rather than dual language learning, contributed to children's smaller vocabulary size. Similarly,

2. Even today, children are told to "speak one language" by well-meaning but uninformed adults (De Houwer 2009).

the well-documented and widely publicized achievement gap between DLLs and native English speakers is sometimes taken as evidence that dual language learning must negatively affect cognition. However, when factors such as SES and school of attendance are controlled for, the achievement gap is greatly diminished (Crosnoe and Turley 2011; U.S. Department of Education, NCES 2001).

In 1962 these ideas about the detriments caused by dual language learning were reversed by a watershed paper by Peal and Lambert (1962) that rectified many of the methodological weaknesses in previous studies and reported positive cognitive and sociocultural consequences of bilingualism. Since that time research has sought to identify and elucidate the areas in which bilingualism benefits language and cognitive development and the areas in which it has little to no effect.

Executive Control

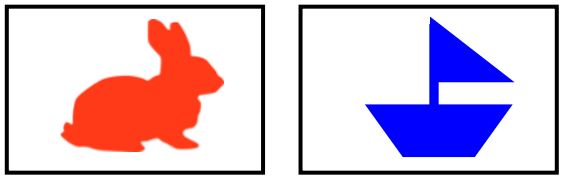
One area in which DLLs consistently outperform monolingual children is executive control tasks (Bialystok 1999; Bialystok, Barac, et al. 2010; Bialystok and Martin 2004; Bialystok and Viswanathan 2009; Carlson and Meltzoff 2008; Mezzacappa 2004; Yang and Lust 2005; Zelazo et al. 2003). Executive control—also called *executive function* or *cognitive control*—describes a set of interrelated cognitive processes that are involved in planning and executing actions. Although several processes are associated with executive control, there is general consensus that at least the following are involved: planning, initiation of activity, working memory, inhibition, mental flexibility, and self-monitoring. For example, imagine a fourth-grader helping to plan a surprise party for her mother. Executive control processes would be involved in all aspects of pulling off the party: planning and initiating the tasks that need to be accomplished for the party (what food to buy, whom to invite, buying the food, sending invitations, and the like); remembering to invite her grandmother when she talks to her on the phone (using working memory); coming up with alternatives when the birthday present she planned to buy is no longer available (mentally flexibility); and inhibiting responses or actions that would give away the surprise to her mother.

The advantages for DLLs in executive control tasks are apparent from infancy. For example, Kovacs and Mehler (2009) taught a group of monolingual infants and a group of *crib bilingual* infants (i.e., infants whose mother and father have been speaking to the infant in different languages since birth) to anticipate the appearance of a rewarding puppet. Seven-month-old

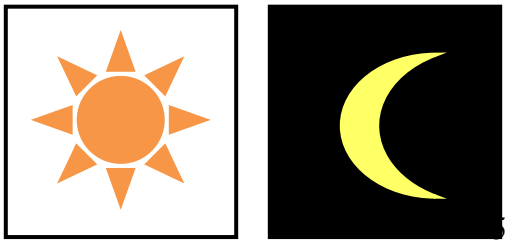
infants sat in front of a video screen. When a series of non-meaningful syllables (e.g., “le mo ve te . . .”) sounded, a puppet would appear in a certain spot on the video screen. Both the monolingual and crib bilingual infants learned to anticipate the appearance of the puppet and look to the correct spot on the video screen when they heard the non-meaningful syllables. Halfway through the study there was a switch: infants heard a different combination of syllables, and the puppet appeared on the opposite side of the screen. Although in the first half of the study both groups of infants had learned to anticipate the puppet, after the switch only the infants who were crib bilinguals correctly anticipated the puppet’s appearance and looked to the new side of the video screen. The crib bilinguals learned to switch to the other side of the screen by using the different combination of syllables as a prompt. However, the monolingual infants continued looking at the spot on the screen where the puppet had appeared for the original combination of nonsense syllables. In other words, the crib bilingual infants were able to inhibit what they had previously learned, whereas the monolingual infants continued with the same behavior that had worked for them in the past.

Executive control increases dramatically during the preschool years (e.g., Zelazo et al. 2003), and evidence for the effects of bilingualism on executive control becomes more pronounced. In preschool children, the development of executive control has been studied with several paradigms. Although the specifics of these tasks differ, the paradigms typically involve three types of tasks:

1. Tasks that involve switching behavior such as the Dimensional Change Card Sorting task (e.g., Zelazo, Frye, and Rapus 1996), which involves learning one set of rules or procedures and, once it is learned, switching to a new set of rules or procedures. For example, children are shown cards depicting either a rabbit or a boat, colored either red or blue, and are asked to sort a set of cards by color and then after a number of trials, the rule is switched, and children are asked to sort the cards by form.



2. Tasks that conflict with natural associations such as the Day-Night Stroop task (e.g., Gerstadt, Hong, and Diamond 1994) in which



children are asked to respond "night" to a picture of the sun and "day" to a picture of the moon.

3. Tasks that require the inhibition of motor responses such as in the Go–No Go task (Drewe 1975). In one version of the task (Thorell et al. 2009), different fruits and fish are displayed, one after the other, on a computer screen. The child is instructed to touch the screen as quickly as he or she can whenever a fruit appears (Go), but not to touch the screen when a fish appears (No Go). Reaction time and errors (i.e., when a child presses the screen mistakenly in response to a fish, thus indicating a failure to inhibit) are noted.

Advantages have been found for bilinguals in all three of these types of tasks. Overall, bilinguals show advantages in task switching (Bialystok and Viswanathan 2009) and tasks that involve suppressing interference (Costa, Hernández, and Sebastián-Gallés 2008). However, they show no advantages in tasks that ask children to delay responding without the need to select among conflicting choices. For example, monolinguals and DLLs perform equally well in the "marshmallow task" (Carlson and Meltzoff 2008). In this task, children are seated in front of a marshmallow and told that if they can resist eating the marshmallow for 15 minutes they will be rewarded with two marshmallows (see Casey et al. 2011 and Mischel, Ebbesen, and Zeiss 1972 for more information). Altogether this pattern of findings suggests that the bilingual advantage in executive control tasks is specific to tasks that require selectively attending to competing options. Thus, bilingual children might be expected to show advantages in situations in which established routines suddenly change. For example, if children's assigned spots during circle time are shifted, DLLs may be better able to adapt to the switch and remember their new location. Likewise, dual language learners may be better able to adapt to changes in classroom rules or procedures. For example, in classrooms where learning centers open and close during the course of the day, DLLs may appear to adapt to the changes more readily than monolinguals.

Importantly, these bilingual advantages do not appear to be related to cultural or socioeconomic factors (Barac and Bialystok 2012; Bialystok and Viswanathan 2009; Carlson and Meltzoff 2008), and advantages for dual language learning have been found in multiple language combinations, including English–Spanish (e.g., Barac and Bialystok 2012; Carlson and Meltzoff 2008), English–Mandarin, English–Cantonese (e.g., Barac and Bialystok 2012),

English–French (e.g., Barac & Bialystok. 2012), and English–Tamil (Bialystok and Viswanathan 2009). For example, in one study (Bialystok and Viswanathan 2009), three groups of eight-year-old children—monolingual English speakers, bilinguals in Canada, and bilinguals in India matched on education and SES—participated in a cognitive control task. Both groups of bilinguals outperformed the monolinguals in tasks that required inhibitory control and switching. In another study, Carlson and Meltzoff (2008) found advantages for bilingual children on tasks that assess executive control when a group of lower-SES Spanish–English bilingual children was compared with middle-class monolingual English-speaking children.

However, Carlson and Meltzoff's 2008 study indicates that the amount of dual language experience did seem to matter. A third group of children in Carlson and Meltzoff's (2008) study had only six months of dual language experience in an "immersion" kindergarten program in which children received instruction in English for half of the day and in either Spanish or Japanese for the other half of the day. This recent immersion group showed no advantage compared to monolingual children, and the effect was found only with native bilinguals, suggesting that intensive experience and practice with more than one language may be required to reap benefits in executive control. This finding is consistent with other research showing that advantages in cognitive performance depend on the extent to which a child is bilingual. In metalinguistic tasks, the degree of bilingualism (bilingual experience) is linearly predictive of children's performance (Bialystok and Majumder 1998). That is, children who are more balanced in their bilingualism show larger advantages than children who are more strongly dominant in one language. And, in measures of creativity and in nonlinguistic tasks of geometric design and creativity, children who were fully English–Italian bilingual performed better than both monolinguals and English speakers with limited proficiency in Italian (Ricciardelli 1992).

Although the bilingual advantage in executive control tasks is well documented, the causes of the advantage remain unclear. One possibility is that the bilingual advantage originates primarily from an enhanced inhibition ability that comes from repeated experience with suppressing one language system. That is to say, when bilinguals switch from one language to another, they remain active in one language and to a certain extent "turn off" or "suppress" the second language. This enhanced inhibition ability would then spill over to other domains, conferring DLLs with advantaged executive control systems. However, studies are increasingly finding a bilingual advantage in tasks that do not require inhibition, suggesting that inhibition may not be a

root cause (Costa et al. 2009). A second possibility is that DLLs have an overall heightened monitoring of the environment. Evidence for this comes from studies showing that in monitoring tasks, German–Italian adult bilinguals outperform Italian monolinguals and show brain activation patterns consistent with more efficient monitoring activity (Abutalebi et al. 2012). By this account, children in a dual language environment continually manage and monitor the communicative situation to determine what language is being spoken and how to respond appropriately (Comeau and Genesee 2001; Yow and Markman 2011). In doing so, DLLs are required to keep track of the changes around them. For example, throughout the day a young DLL takes into consideration what languages are being spoken by whom and in which activities. They are also deciding on the language in which they should respond. The thought is that this heightened monitoring results in a cognitive advantage for bilinguals as they approach a variety interactions, tasks, and activities.

Memory

The evidence for bilingual effects on memory is mixed. Kormi-Nouri, Moniri, and Nilsson (2003) assessed monolingual Swedish and Persian–Swedish bilingual second- through sixth-graders on tests of two types of memory: (1) episodic memory, which is memory for experienced events—such as remembering the experience of riding a roller coaster for the first time or remembering how the classroom rabbit's fur feels; and (2) semantic memory, which is memory for ideas, concepts, and meanings—such as remembering that the tool used to cut paper is called a "scissors" or recalling the name of the state capital of Idaho. In their study (Kormi-Nouri, Moniri, and Nilsson 2003), episodic memory was tested by presenting children verbal statements or activities (e.g., hug this doll) and semantic memory was tested by having children encode word lists of common words. In tests in which children were either asked to recall as much as they could on their own (i.e., free recall) and tests in which children were given some cues to recall (e.g., Were there any names for fruits on your list?), bilinguals showed a moderate advantage compared with monolingual children, which thus suggests that bilingualism has a positive effect for children's long-term memory. A follow-up study with three language groups (Persian monolingual, Turkish–Persian bilingual, and Kurdish–Persian bilingual) also found positive effects of bilingualism in episodic and semantic memory tasks; interestingly, the effect was more pronounced for older children than younger children (Kormi-Nouri et al. 2008). This finding might suggest that any potential memory benefits from being a dual language learner

may not be easily apparent in the preschool years.

However, in another study in which younger and older adults (both monolinguals and bilinguals) were asked to recall lists of 20 words under various conditions, the bilingual group recalled fewer words at both ages and under all conditions (Fernandes et al. 2007). And in a study in which seven-year-old children were asked to recall increasingly long strings of words (all animal names), there were no differences between monolingual and bilingual children (Bialystok and Feng 2010).

But, because both of the tests involved recall of verbal information, one possibility is that because bilinguals tend to experience more difficulty with lexical retrieval, memory would be better assessed in a nonverbal task. Morales, Calvo, and Bialystok (2013) did this by presenting children with a spatial memory task involving an array of 3-inch by 3-inch squares that children were told represented different ponds. At each trial, three of the squares were sequentially highlighted by a picture of a frog that, children were told, represented the frog jumping into the pond. The conditions varied in complexity: in the simplest condition, children needed to remember only the actual order in which the frogs appear on the squares. But in more complex conditions, children were asked to recall the squares according to some transformative rule. For example, children had to recall the ponds in reverse order. In the simple condition, monolingual and bilingual children did not show any differences, but in the more complex conditions where the working memory demands were greater, the bilingual children outperformed the monolingual children.

Lexical retrieval is one area of memory in which bilingual speakers consistently show a deficit in comparison with monolingual speakers. *Lexical retrieval* refers to the cognitive ability to retrieve words. Although there are a variety of ways of measuring lexical retrieval, in essence all forms involve measuring the ability to access words from memory. For example, picture naming involves presenting a picture of something to subjects and then measuring the amount of time it takes for them to retrieve the label from memory. One common version of this is the Boston Naming Test (Kaplan, Goodglass, and Weintraub 1983) in which participants are asked to name a series of line drawings of objects. Tip-of-the-tongue paradigms involve presenting subjects with definitions or pictures of age-appropriate but relatively rare words (e.g., a young child might be shown a picture of an igloo) and then measuring whether the word is retrieved and the retrieval time (e.g., whether the subject retrieves the word *igloo* and how long it takes).

Verbal fluency tasks involve listing as many words as the subjects can think of within a prescribed time limit (e.g., list all the words you can think of that are foods; list all the words you can think of that start with the letter *s*).

Across lexical retrieval tasks, bilinguals have slower retrieval times in picture naming (e.g., Kaushanskaya and Marian 2007), encounter more difficulty in tip-of-the-tongue paradigms (Gollan and Acenas 2004), and have lower scores on verbal fluency tasks (Portocarrero, Burright, and Donovick 2007), suggesting that bilinguals experience some degree of interference from their other language (Costa 2005).

These results are even more pronounced when speakers are assessed in the nondominant language rather than their dominant language (Ivanova and Costa 2008). One hypothesis is that because bilinguals split their language time between two languages, their associations are weaker than monolinguals and thus may take bilinguals slightly longer to retrieve lexical items. Another possibility is that the increased retrieval time is due to competition from the corresponding word in the nontarget language (Green 1998). Although the differences between lexical retrieval times of bilinguals and monolinguals are statistically significant in the laboratory (where scientists rely on precise instrumentation to measure reaction time), the differences are not likely to be apparent through casual observation in the classroom and may have little consequence in everyday settings. However, in classroom activities in which fast responses are encouraged (e.g., the teacher holds up a picture of an animal, and the children shout out the name as fast they can), children who are DLLs may have slightly longer delays in responding than children who are learning one language, particularly when their dominant language is not the language of instruction.

Thus, the evidence for the effects of dual language learning on memory is more equivocal than in other domains. For tasks based on verbal recall, there may be disadvantages for DLLs, depending on the specifics of how verbal recall is assessed. However, this appears to be mediated by language experience. Children are likely to have more difficulty with lexical retrieval in their nondominant language than in their dominant language. For nonverbal materials that have more intensive working memory demands, there seems to be an advantage for dual language learners. This is most likely to be seen in situations in which children have to hold several things in mind while they complete a task. For example, when requests involve multiple steps that must be kept in memory, such as “Please bring me your cup, then pick up the plastic

utensils and put them in the recycling bin in the kitchen," DLLs may have an easier time keeping track of the steps and executing them in the correct order.

Language

Code Switching

Code switching is the use of multiple languages within a single conversation—for example, asking "Dónde está mi coat?" using Spanish for part of the sentence but using the English word *coat* instead of the Spanish word *abrigo*. Code switching is frequently observed in the language usage of DLLs (California Department of Education 2008, 2009). Code switching serves communication purposes and seldom occurs when the DLL child is alone (Dolitsky 2000). When a child speaks alone, the child is not subjecting himself to the influence of other speakers. Code switching can also serve as a gap-filler (Bernardini and Schlyter 2004) or as an avoidance strategy when the DLL child does not know the target word in one language (Wei and Lee 2001).

Code switching is thought to be the result of the interactions of the two lexicons of the DLL (Bernardini and Schlyter 2004; Cantone and Muller 2008). Studies have shown that DLL children demonstrate adherence to adult-like structural constraints in most of their code switching. This implies that they have complex knowledge of how to fit their two languages together in one utterance during production and that they possess language-specific syntactic knowledge early on (Paradis, Nicoloadis, and Genesee 2000).

Age differences exist in children's patterns of code switching. When adult bilinguals have a conversation with a monolingual speaker, they adapt their language patterns such that they speak in the shared language. DLLs aged three to five years old displayed language choice patterns consistent with those of their bilingual community; however, younger children were more affected by a variety of factors (Paradis and Nicoladis 2007). Most bilingual preschool children have more advanced development, in one of their two languages, and this is commonly referred to as their *dominant language*. Language dominance did not constrain the older DLLs' (ages three to five) language choice to the same extent as younger DLLs (age two) (Paradis and Nicoladis 2007). That is, younger children are more likely to use words and phrases from their dominant language when speaking to a language partner who speaks the child's nondominant language. Social context, such as familiarity with the person one is speaking to, also influences language choice (Paradis and Nicoladis 2007). Moreover, the age when DLL children begin to

produce in their nondominant language also has an impact on the type and frequency of code switching (Jisa 2000). Yet, in most cases, DLLs appear to use words and phrases from the language that is shared more broadly and by a greater majority of people regardless of their language dominance.

Vocabulary

During the preschool years, children's vocabularies grow immensely. Children start speaking their first words at around one year of age. By six years of age, children know at least 10,000 words (Anglin and Miller 2000).

Past studies suggest that the bilingual children's vocabularies are stored separately for each language they know (Pearson, Fernández, and Oller 1993). Bilingual children have been shown to know two different words for the same concept, one in each language, whereas monolingual children are thought to avoid synonyms. When the children's two languages are more similar, the degree of overlap in young children's vocabularies may be greater (Schelletter 2002). For example, a study that observed a two-year-old German–English DLL shows that although there were not many form-identical nouns where the words had identical sounds (such as English: *teddy–German: teddy*), they were used quite frequently. Additionally, form-similar nouns where the words had similar sounds (such as *book–buch* and *apple–apfel)* made up 38 percent of all the noun types in both languages. When children's total vocabulary knowledge is combined across their two languages, young DLLs have been found to have the same size vocabularies (Junker and Stockman 2002; Pearson, Fernandez, and Oller 1993) and the same rate of vocabulary growth as English-speaking monolinguals from the ages of 18 months to three years (Pearson, Fernandez, and Oller 1993).

When vocabulary is considered separately for each individual language, the majority of studies show that bilingual infants and preschoolers have smaller vocabularies and slower rates of growth over time in each language when compared with English-speaking monolinguals (Bialystok 2009; Mahon and Crutchley 2006; Oller and Eilers 2002). There is evidence that this may be confounded with low SES. Bilingual children from homes of low SES scored two or more standard deviations below the English and Spanish norms on standardized vocabulary tests (Hammer, Lawrence, and Miccio, 2008a; Tabors, Paez, and Lopez 2003). Yet even when the SES of DLLs was higher than that of their monolingual counterparts, the Spanish-speaking DLLs scored significantly lower than the mean of the monolingual sample in English (Umbel et al.

1992). This may be due to the fact that vocabulary in each language is heavily dependent on the amount of input per language for bilinguals (De Houwer 1995; Patterson 2002; Pearson et al. 1997).

However, in a recent study, Barac and Bialystok (2012) found that bilingual children do not have lower English vocabulary scores than English monolinguals, when bilinguals are schooled in English, their SES is matched with monolinguals, and there are similarities between the two languages of the bilingual (e.g., Spanish and English). In this study, Spanish–English bilinguals obtained scores comparable with monolinguals and outperformed both French–English and Cantonese–English bilinguals on English receptive vocabulary. All children were from homes with comparable SES. Both Spanish–English and Cantonese–English bilinguals were being schooled in English, while the French–English were schooled in French. This study suggests that both language similarity and language of schooling contribute to bilingual children's vocabulary performance. Thus, when examining the vocabulary performance of DLLs, we need to consider a number of factors, including the similarities between the two languages, the language of the child's school experience, and the quality and quantity of the child's exposure to each language.

Several studies that have analyzed the vocabulary composition of bilingual children's lexicon have found that bilingual children showed distributions much like those described for monolingual children (Conboy and Thal 2006; David and Wei 2008; Holowka, Brosseau-Lapré, and Petitto 2002; Levey and Cruz 2003; Pearson et al. 1997). For example, studies have found that nouns dominate children's early vocabularies more than later vocabularies in both monolingual and bilingual children. Furthermore, in a study on children's comprehension of English vocabulary words, words associated with school (e.g., *recess*) were understood equally well by monolingual and bilingual children, but the comprehension of words primarily associated with home (e.g., *toothbrush*) were comprehended better by monolinguals (Bialystok, Luk, et al. 2010). This suggests that the language context in which children learn the vocabulary words may matter for how well they can comprehend it in a given language.

Past studies have found mixed evidence on transfer effects on vocabulary. One study found a positive cross-linguistic relationship between receptive vocabulary in Hmong and expressive vocabulary in English with three- to five-year-old Hmong-speaking bilinguals (Kan and Kohnert 2008). Another study reports receptive vocabulary size in the first language predicting receptive vocabulary size in the second language with Spanish–English speaking five-year-old bilinguals

(Uchikoshi 2006). Tabors, Páez, and López (2003), however, found a small negative relationship between bilingual preschoolers' Spanish and English expressive vocabularies. Another study with two languages that are from different language families and do not share any cognates (e.g., Turkish and Dutch) found that vocabulary size in L1 (i.e., the child's first language) did not predict L2 (i.e. the child's second language) expressive or receptive vocabulary development (Verhoeven 1994). The mixed results may be due to scoring methods (using standard scores that take children's ages into account versus raw scores that do not), vocabulary measures (receptive versus expressive vocabulary), and the bilingual abilities of the children.

Differences in vocabulary abilities have also been identified between DLL children who are simultaneous learners and sequential learners. *Simultaneous DLLs* are children who have started acquiring two languages beginning at birth or sometime during the first year of life, while *sequential DLLs* are children who begin the process of acquiring the second language after making significant progress toward the acquisition of the home language (De Houwer 2009; California Department of Education 2008, 137). Hammer and her colleagues (Hammer, Lawrence, and Miccio 2008a) observed that simultaneous learners entered Head Start programs with higher English vocabulary scores than sequential learners, but sequential learners entered Head Start programs with higher Spanish vocabulary scores than simultaneous learners. Both groups increased their English vocabulary over the two years in Head Start. Because the sequential learners had limited knowledge of English at the beginning of the study and English was the language of instruction at school, the sequential learners had to quickly adjust to speaking and hearing English at school. This resulted in greater gains in their receptive language vocabulary development than children with bilingual exposure at home.

A recent study with both Cantonese–English and Spanish–English low SES bilinguals showed that for both expressive and receptive English vocabulary, DLL children who were exposed to English from a younger age had higher English vocabulary scores at age five than DLL children who were exposed to English later (Uchikoshi, 2012). This gap did not lessen even at the end of second grade. Moreover, this earlier exposure to English had no effect on children's native-language vocabulary scores at age five. That is, there were no differences in L1 vocabulary at age five between DLL children who were exposed to English at a younger age and those exposed at an older age.

To sum, several factors are known to affect children's vocabulary growth: similarities

between the two languages being learned, the language of schooling, age of acquisition of each language, the child's SES, and the quality and quantity of their exposure to each language. Further, DLLs develop vocabulary separately for each of their languages, and the rate of vocabulary development may not be the same for each language. When the size of vocabulary in DLLs is evaluated, vocabularies from both languages need to be considered in total. This may require teachers and practitioners to enlist help from parents or knowledgeable others who can evaluate the child's home vocabulary.

Syntax/Grammar

Syntax refers to the complex rules for how words can be arranged to form sentences in a given language. Past research suggests that the two grammatical systems in a bilingual child may develop independently (Genesee, Nicoladis, and Paradis 1995) and, at the same time, influence each other or be subjected to cross-linguistic influence (Hulk and Müller 2000).

Syntactic transfer from one language to the other is suggested to be dependent on either the dominance of one language of the bilingual (Yip and Matthews 2000, 2006), or the clarity of the language input (Hulk and Müller 2000; Müller 1998). Bilingual children tend to bring elements from the dominant language into the less-dominant language (Gawlitzek-Maiwald and Tracy 1996), although transfer is also possible to occur from the weaker to the stronger language.

A recent study suggests that differences in the impact of bilingualism depend on the language of schooling (Barac and Bialystok 2012). In that study, Spanish–English bilinguals outperformed French–English bilinguals on English grammatical knowledge. In fact, Spanish–English bilinguals obtained scores comparable with monolinguals. Spanish–English bilinguals were being schooled in English, while the French–English were schooled in French. This study suggests that language of schooling contributes to bilingual children's grammatical performance.

Oral Comprehension

Oral comprehension (i.e., the ability to recall and understand information that is presented orally) involves aspects of both vocabulary and syntax. Minimal attention has been paid to bilingual children's oral comprehension. In a review commissioned by the Center for Early Care and Education Research: Dual Language Learners, only two articles on oral comprehension were identified (Hammer et al. 2012). Both papers were from Hammer, Lawrence, and Miccio's (2008a, 2008b) longitudinal study of bilingual Head Start children. The study found differences in oral comprehension between simultaneous and sequential learners. Simultaneous learners

began and ended Head Start with higher English comprehension than their sequential counterparts, while sequential learners had consistently higher Spanish comprehension than their simultaneous counterparts. Although both groups' abilities to comprehend Spanish and English were below monolingual expectations at the beginning of Head Start, their English abilities increased over the two-year period, with simultaneous learners' scoring within the typical monolingual range by the end of Head Start. On the other hand, both groups' Spanish abilities increased initially but then decreased during their time in Head Start, indicating that their development was not keeping up with the monolingual norms (Hammer, Lawrence, and Miccio2008a). This outcome is likely to be because English was the language of instruction and so although children were receiving more practice speaking and comprehending English during the day, they were spending less time speaking and comprehending Spanish than their monolingual peers.

Phonological Awareness

Learning to read is perhaps a child's greatest cognitive achievement in the elementary school years. Several prereading prerequisites are learned in the elementary school years. Foremost among them is *phonological awareness*: "the ability to detect or manipulate the sound structure of spoken words, independent of meaning" (California Department of Education 2008, 89). It is an increasingly sophisticated ability that is highly predictive of, and causally related to, children's later ability to read. Training in phonological awareness can lead to benefits for word identification, spelling, and reading comprehension (Ehri et al. 2001).

Past studies suggests that bilingual infants and preschoolers have two separate phonological systems (Anderson 2004; Brice, Carson, and O'Brien 2009; Fabiano and Goldstein 2005; Fabiano-Smith and Barlow 2010; Fabiano-Smith and Goldstein 2010; Gildersleeve-Neumann and Wright 2010; Gildersleeve-Neumann et al. 2009; Paradis 2001; Simon 2010). Bilingual infants' speech sound production may not be equivalent to monolinguals in their less-dominant language during their early years; however, bilingual preschoolers appear to catch up to monolingual levels and their speech sound accuracy is high in their two languages (Fabiano-Smith and Goldstein 2010; Lin and Johnson 2010). Furthermore, their phonological accuracy is higher for sounds that are shared between their two languages than sounds that are not shared (Fabiano-Smith and Goldstein 2010). Thus by the time children begin to read, bilingual

children's phonological awareness is at least equivalent to monolingual children's phonological awareness.

Phonological awareness skills are related across languages for bilinguals and appear to transfer between languages (Anthony et al. 2009; Dickinson et al. 2004; Kim 2009; López and Greenfield 2004; Tabors, Páez, and López 2003). Cross-language correlations in performance of phonological awareness tasks have been reported for early elementary school age Spanish–English bilinguals (Lindsey, Manis, and Bailey 2003), English–French bilinguals (Comeau et al. 1999), and Cantonese–English bilinguals (Luk and Bialystok 2008), suggesting a common basis for this ability across languages. Cross-linguistic effects have been observed in children's speech sound productions, with some evidence suggesting that the dominant language has a greater influence over the weaker language (Paradis 2001). These effects are observed less frequently as children develop their speech sound abilities over time (Fabiano-Smith and Barlow 2010; Gildersleeve-Neumann et al. 2009; Gildersleeve-Neumann and Wright 2010; Lin and Johnson 2010).

The evidence of a bilingual advantage in phonological awareness has been mixed. Some studies report a bilingual advantage for five-year-olds that disappears by age six when children begin instruction in reading (Bruck and Genesee 1995; Campbell and Sais 1995; Yelland, Pollard, and Mercuri 1993). Yet when the language of testing was the same as the language of literacy instruction and when bilingual children were fully competent in both of their languages, Bialystok and colleagues (Bialystok, Majumder, and Martin 2003) found no evidence of a bilingual advantage with preschoolers on all phonological awareness tasks except one. The phoneme segmentation task was the only task that produced a significant advantage for the Spanish–English bilinguals over the Chinese–English bilinguals and English monolinguals. The authors suggest that the Spanish–English bilinguals had acquired more explicit understanding of sound-symbol correspondences, due to the transparency of Spanish orthography. Spanish orthography is transparent in that it is based on consistent letter-sound mappings. In a later study examining Chinese-speaking children learning English (ESL) in Hong Kong, Chinese–English bilinguals in Canada, and a monolingual English group in Canada, Bialystok and colleagues (Bialystok, McBride-Chang, and Luk 2005) found that the Chinese–English bilinguals in Canada performed similarly to the monolinguals in Canada on phonological awareness tasks, yet the Chinese-speaking ESL students did not perform as well. The Chinese-speaking ESL students

were learning English, a minority language, in Hong Kong, where the predominant language and language of schooling is Cantonese. All three groups performed similarly well on syllable awareness tasks. The authors conclude that English enables phonological awareness, while exposure to Chinese promotes syllable awareness. The authors suggest that phonological awareness develops in part as a consequence of experience with particular languages and that bilingualism on its own does not influence phonological awareness skills.

To sum, phonological awareness develops in the context of the languages with which the child has consistent experiences. Moreover, phonological awareness skills are related across languages for bilinguals and appear to transfer between languages, regardless of the language combinations. Because phonological awareness develops from experience with languages, practitioners who work with young children should be cognizant that the child is receiving quality experiences (i.e., experience with fluent speakers) in each of their languages.

Decoding

Decoding, the ability to sound out letters and put them together to form a word, has also been shown to contribute to the reading process for Spanish-speaking DLLs (National Reading Panel 2000). Children must be able to decode words not only accurately but also fluently (Roberts, Good, and Corcoran 2005; Roehrig et al. 2008). Efficient and automatic word reading allows students to use cognitive resources for understanding meaning in text rather than identifying and decoding words (Perfetti 1998).

Past studies report that there are no overall influences of bilingualism on decoding, but what matters is the relationships between children's level of proficiency in each language, their progress in literacy development, and the relationship between the two writing systems (Bialystok, Luk, and Kwan 2005; Bialystok, McBride-Chang, and Luk 2005). Thus developing proficiency in two or more languages will not hurt a child's ability to read. Decoding skills need to be developed separately for each language. Unlike phonological awareness, there is no evidence of transfer when the writing systems are different, such as Chinese and English (Gottardo et al. 2001; Huang and Hanley 1994). Bialystok and colleagues (Bialystok, McBride-Chang, and Luk 2005) found that the skills the Canadian children had acquired to read English did not help in learning a larger base of reading vocabulary in Chinese, which is a process mainly based on memorization. However the Chinese and English scores were correlated for the children in Hong Kong who were more advanced in reading Chinese and were just starting to

learn how to read English. Moreover, they found similar results between the children in Hong Kong who were learning to read in English and the Chinese-speaking children in Canada who were in the earlier stages of reading English. The authors suggest that children at the earliest stages of reading apply a single approach to both systems.

With bilinguals whose two languages have similar writing systems, Bialystok and colleagues (Bialystok, Luk, and Kwan 2005) found a bilingual advantage in decoding when bilinguals were compared with monolinguals. Both Spanish–English and Hebrew–English bilinguals, whose two languages are based on the alphabetic principle, had significantly higher scores on nonword decoding, when compared with English-speaking monolinguals. The bilinguals also showed strong correlations between their nonword decoding skills in their two languages. Bilinguals whose two languages are written using the same system also have the potential for transfer of reading principles across languages. However, for bilinguals whose two languages have a different writing system, such as Chinese–English bilinguals, although they showed some advantage over the monolinguals on decoding skills, their advantage was modest and not significant. Thus teachers and caregivers may want to have some awareness of the structure of each language the child is learning, (e.g., Do the languages share the same alphabet? Is the language read from left to right or right to left?).

Mathematics

Much of what young children master in the preschool years involves learning the counting sequence and developing a number sense (see California Department of Education 2008, 160–66 for more information about mathematical reasoning). By two to three years of age, children typically know at least a portion of the counting procedure (Fuson 1988) and can execute it with a variety of objects. Although there is a limited amount of research describing DLLs' counting performance in each of their languages, one study of three- to five-year-olds (Rasmussen et al. 2006) found no difference in how high Chinese–English bilingual children could recite the counting sequence in Chinese or English or in how high they counted objects in the two languages.

In addition to counting, children must also discover cardinality (California Department of Education 2008, 160): that is, knowing that when you count, "1-2-3-4-5," you have five things. The cardinality of a group is the number of items it contains. One of the surprising things about cardinality is that it emerges well after children have mastered the counting sequence (on average

around 18 months later). One method for assessing cardinality is using what's called the "give-n task" (where the "n" designates a number). In this task, children are given a set of objects and are simply asked to give the experimenter a specific quantity (e.g., "Give me four"). Sarnecka, Wright, and Goldman (2011) found that dual language learning English–Mandarin and English–Korean preschoolers had strong associations between the quantities they accurately produced in each of their two languages. That is, if a DLL knows the meaning of the word *three* in one of her languages, it is likely she knows the concept of *three* in her other language as well. These results are particularly interesting because the mapping of number systems between languages is not particularly transparent in these language pairings. For example, the Korean has two overlapping systems of counting and requires a *classifier,* a word denoting a unit of measurement, to accompany counting and number words.[3] English, on the other hand, has a single counting system and only idiosyncratic classifiers (e.g., five *pairs* of pants). Together these studies suggest that what children conceptually know about number readily transfers regardless of which language system children are using at the moment.

In some language pairings, the properties of one language may have advantages that may affect children's understanding in other languages. For example, Chang and Sandhofer (2009) asked bilingual English–Mandarin parents to read their dual language learning children one picture book in Mandarin and one picture book in English. The pictures in the two books were designed to elicit talk about counting and number. Surprisingly, parents talked three times more about number when they spoke in Mandarin than they did in English. The difference was attributed to syntactic properties of the two languages. Because Mandarin does not have a way to denote the plural (i.e., apples, dogs) to indicate more than one object, parents had to use a number word and thus children received substantially more number language input. Further, Miura and others (1999) suggested that the way English and Korean express fractions makes it relatively easier or harder to grasp the concept. In English the fraction ¼ is expressed as "one-fourth," but in Korean the fraction is expressed as "of four parts, one." Miura and colleagues argued that this language difference accounted for higher scores among Korean first- and second-graders on a fraction concept test. That is, because the way fractions were labeled in Korean provided more transparency than the fraction labeling system in English, learning about

3. English uses some classifiers for some types of nouns to specify a unit of measurement. For example, one *piece* of cake or one *slice* of cake; one *glass* of water or one *bottle* of water.

fractions was more intuitive to Korean–speaking children than to English–speaking children. To examine this idea, Paik and Mix (2003) taught English monolingual first- and second-graders to label fractions using a direct translation from Korean and found significant increases in children's performance on a fraction test in which children had to select a picture representing specific fractions. This research indicates that different languages describe concepts (mathematical and otherwise) in different ways, and some of these ways may be more transparent to early learners. Teachers may want to become aware of how mathematical concepts are expressed in the languages that children are learning in order to better aid children in developing early mathematical competence.

Science

There is a dearth of research on the role of dual language learning on science. Much of the research on preschool science has been done with monolingual English children (e.g., Peterson and French 2008; Von Blum 1998). To date, there are no studies on how dual language learning or bilingualism affects the knowledge acquisition of science or causal reasoning. Instead, studies have focused on professional development (e.g., Von Blum 1998) and curriculum development (e.g., Gelman and Brenneman 2004; Peterson and French 2008). Results of these studies have shown increases in the development of children's language skills through science inquiry, as well as increases in Head Start teachers' comfort levels with science, and increases in the number and quality of science-related interactions between students and teachers in the Head Start classrooms (Von Blum 1998).

Although little research has been conducted on how learning more than one language affects the development of science learning, there is general agreement that DLLs need to develop both English language as well as scientific literacy (Warren, Rosebury, and Conant 1989). Studies on science with elementary school age DLLs have focused on teaching methods that build on children's prior knowledge and use their native language so that DLL children can tap into their background knowledge to understand new scientific concepts or vocabulary (Handsfield and Jiménez 2009; Lee and Luykx 2007). When instruction and testing or assessment occurs exclusively or predominantly in English, DLLs' limited proficiency in English constrains their science achievement (Lee and Luykx 2007). There is evidence that inquiry-based instructional interventions develop science knowledge and literacy achievement of DLLs when learning occurs in contexts that are linguistically and cognitively supportive (Amaral, Garrison, and

Klentschy 2002; Bravo, Hiebert, and Pearson 2007, Cuevas et al. 2005; Kelly and Breton 2001; Lee et al. 2006, 2005; Merino and Hammond 2002). Altogether this evidence suggests primary goals for teachers who implement a science curriculum with young DLLs: augment children's science vocabulary and connect to children's preexisting knowledge in order to support scientific inquiry. For example, both monolingual and dual language learners may be unfamiliar with terms such as *metamorphosis,* and both bilingual and monolingual learners may be equally excited to watch a butterfly emerge from a cocoon. However, DLLs may be less familiar with some of the supporting words (e.g., *caterpillar*, *butterfly*, *hatching*) that teachers may use to guide children's observations and may benefit from teacher support to connect concepts that are understood in their home language to (e.g., *the butterfly* is *la mariposa*).

Social–Emotional Development

Much of cognitive development occurs within the context of social interactions with parents, caregivers, teachers, peers, and others. Through social interaction the developing child learns about the world around them, and it is language that provides the medium through which children learn about expected behavior (Eisenberg 1999; Rogoff 1990). Social–emotional development encompasses a wide range of topics, including self-regulation, attachment, social cognition, social competence, and emotional expression. Social–emotional development may be related to cognitive development. For example, the four-year-old children who were able to delay eating the marshmallow in Mischel's (Mischel, Ebbesen, and Zeiss 1972) marshmallow experiment were, as adults, more academically successful than the four-year-olds who immediately ate the marshmallow. In fact, self-control was a more powerful predictor of later academic success than IQ in this task. And, kindergarten children who scored higher on social competence measures made stronger gains in mathematics than those children who scored lower in social competence (Galindo and Fuller 2010).

Current research suggests that DLLs either show no differences in social–emotional development from their monolingual peers or that DLLs have advanced social–emotional development compared with monolinguals (e.g., Han 2010). This seems to be the case despite differences in SES. However, across various research studies there was variation based on children's language proficiency in the classroom. For example, Chang and others (2007) found that children who were predominantly Spanish speakers showed more conduct problems and less frustration tolerance when instruction was delivered in higher proportions of English, but higher

teacher closeness, peer social skills, and better task orientation resulted when instruction was delivered in higher proportions of Spanish. This finding suggests that a child who is having social issues in the classroom may benefit from some interaction with or direction from the teacher in the child's home language.

In general, research studies focused on the social–emotional development of young DLLs are scarce. In a recent review commissioned by the Center for Early Care and Education Research: Dual Language Learners, only 15 peer-reviewed studies published between 2000 and 2011 met the inclusion criteria for consideration, and most of those studies involved children from Spanish-speaking backgrounds (Halle et al. under review). This review examined studies that focused on children's self-regulation, social competence, social cognition, and problem behaviors. Although there were methodological constraints associated with many of the studies, such as the definition of *dual language learner*, results of the review suggest that there are areas where social development in DLLs is similar to their monolingual peers and there are also areas of difference. There is some support that the use of the home language in early childhood settings has a positive effect on social–emotional outcome. For example, in the study by Chang and others (2007) (mentioned earlier in this paper), teacher closeness was positively related with the use of the child's primary language. However, the review notes that contextual and individual factors are highly associated with second-language learning, making it difficult to draw clear conclusions about the relationship of DLL status to social–emotional development.

In her study of bilingual and monolingual children, Han (2010) found that fluent bilingual Latino children demonstrated more sophisticated approaches to learning than English speakers at kindergarten entry, and this distinction was maintained through fifth grade. In contrast, monolingual non-English speakers demonstrated lower self-control and interpersonal skills by fifth grade. In an investigation of school readiness in immigrant (some of whom were presumably DLLs) and nonimmigrant four-year-olds, De Feyter and Winsler (2009) found that first-generation immigrant children had fewer behavior problems and more positive social–emotional outcomes such as initiative, closeness with adults, and self-control. In that study, immigrant children also showed higher scores in approaches to learning and interpersonal skills. Although some studies show differences between bilingual and monolingual children, other studies find no differences. For example, Rumberger and Tran (2006) found no differences in

social skills between bilinguals and monolinguals in their examination of the Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (ECLS-K), a national data set of children.[4]

Recommendations and Implication for Program Practice

1. Because bilingualism conveys many cognitive advantages, dual language learning should be supported and encouraged in the preschool years. There is a scientific consensus that children have the capacity to learn two languages from birth and that this early dual language exposure does not confuse children or delay development in either language. In fact, dual language learning provides children with many cognitive benefits. Some of these benefits may not be easily apparent in the preschool years, but children's early experience of being bilingual may show later cognitive advantages. Areas in which children show robust detriments when measured with precise instrumentation in the laboratory, such as being slower to retrieve infrequent words, may have little consequence in everyday settings in which the delays are not observable.

2. Children should be provided with high-quality language experiences and support to master both of their languages. Across multiple domains, the cognitive advantages of bilingualism were strongest when children were proficient with both languages, and there were no discernible benefits to dual language learning when children's experience with one language was limited. For example, Carlson and Meltzoff (2009) found that six months of experience in a dual language immersion kindergarten program was not enough experience for children to demonstrate benefits of dual language learning. This finding is consistent with other research showing that advantages in cognitive performance depend on the extent to which a child is bilingual. Because DLLs are developing language proficiency in two languages simultaneously during the preschool years, both languages need to be supported and fostered. One of the best ways to provide children with high-quality language experiences is in social settings in which children practice, interact, and speak with other proficient users of the language. Parents should be encouraged to continue to

[4] The Early Childhood Longitudinal Study (ECLS) program includes three longitudinal studies that examine child development, school readiness, and early school experiences. For further information regarding the ECLS-K, visit http://nces.ed.gov/ecls/.

interact and speak with their child in the home language to further develop proficiency in the home language. At the same time, early experiences interacting with English speakers (such as in a preschool classroom) will provide opportunities for children to develop English proficiency.

3. Preschool and kindergarten teachers should know that DLLs may have social–emotional advantages in the classroom, such as greater self-control and interpersonal skills (Han 2010). However, children who cannot communicate their wants or needs or do not understand what is expected of them may require more explicit guidance that includes nonverbal cues, have more conduct problems without an outlet to express their feelings, and appear less tolerant of frustration (Chang et al. 2007) One way to help a child with these challenges is to increase the proportion of communication in the child's home language.

4. There may be some differences in cognitive, language, and literacy development, depending on which other languages a child speaks. For example, there are no overall influences of bilingualism on decoding, but what matters is the relationships between children's level of proficiency in each language, their progress in literacy development, and the relationship between the two writing systems (Bialystok, Luk, and Kwan 2005; Bialystok, McBride-Chang, and Luk 2005). Thus developing proficiency in two or more languages will not hurt a child's ability to read. There may also be positive transfer effects when the two languages share a writing system (such as in English and Spanish writing systems, but not in English and Chinese writing systems). However, some differences in how concepts are conveyed in a child's home language may lead to errors as well. For example, speakers of English typically have difficulty learning to distinguish in Spanish *conocer* and *saber* because both words are associated with the broader English verb "to know," but children learning Spanish as a first language do not frequently confuse the terms. Both language similarity and the language of schooling may contribute to bilingual children's vocabulary performance (Barac and Bialystok 2012). Thus, when examining the vocabulary performance of DLLs, we need to consider a number of factors: the similarities

between the two languages, the language of the child's school experience, and the quality and quantity of the child's exposure to each language.

5. An assessment of DLLs' cognitive development should consider the following factors: the similarities between the two languages, the language of the child's school experience, and the quality and quantity of the child's exposure to each language. Although DLLs may exhibit errors that are uncommon in monolinguals, these errors may be a normal part of cognitive development for a DLL. High-quality interactions in English and the child's home language will lead to competency in both languages over time.

Conclusion

So what are the cognitive consequences of learning multiple languages early in life? A growing body of research indicates that dual language learning, far from confusing children, may lead to enhancements in many areas of cognition, but may also lead to some challenges (such as in tasks that require rapid word retrieval). The advantages for dual language learning appear to be associated with developing proficiency and competency in both languages, and thus providing DLLs with high-quality interactions in both languages is a critical factor in children's cognitive development.

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Paper 3

Program Elements and Teaching Practices to Support Young Dual Language Learners

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The U.S. census shows that young children with home languages other than English make up the fastest-growing segment of the population nationwide. This number has increased 150 percent in the last 20 years, while the student population has increased by only 20 percent (Goldenberg and Coleman 2010). California is at the forefront of this trend of increasing cultural and linguistic diversity, with the California Department of Education (CDE) reporting that 23.2 percent of children in public schools serving kindergarten through twelfth grade are English learners (California Department of Education 2012).

The term *English learner* is commonly used in K–12 (kindergarten through grade twelve) schools to identify children who speak a language other than English at home and are not yet proficient in English. However, preschoolers with a home language other than English are often a distinct group, since they are still developing the basics of oral language in their home language even as they begin to learn English. Therefore, many preschool programs choose to use the term *dual language learners* (DLLs) to describe children who are learning English while also developing proficiency in their native language (Severns 2012).

According to the report of the Public Policy Institute of California, about 11 percent of the state's four-year-olds are enrolled in federally funded Head Start programs, and an additional 17 percent are enrolled in State Funded Preschool (Cannon, Jacknowitz, and Karoly 2012). Of those, nearly 40 percent are young DLLs (Cannon, Jacknowitz, and Karoly 2012). There are 59 home languages reported by the California Department of Education for students in preschool through twelfth grade. The most prevalent are Spanish (82.7 percent) and Vietnamese (2.7 percent), with the following languages each representing less than 2 percent of the school population: Cantonese, Tagalog/Filipino, Hmong, Mandarin, Korean, Arabic, Punjabi, and Russian (California Department of Education 2012). Most, if not all, preschool teachers in California will work with young DLLs at some point in their career. Understanding what the research tells us about program elements and teaching practices that support the learning and development of young DLLs is therefore a priority for educators and policymakers.

The availability of recent research offers new insights about program elements (such as class size and instructional approach) and strategies (such as how to address the components of language learning and what instructional supports to use) that may be effective in preparing young DLLs for entry into kindergarten. This paper summarizes research on the effectiveness of program elements and instructional strategies currently available in California and elsewhere to

address the needs of the diverse population of young DLLs. Knowledge gaps are identified, and recommendations based on the strongest available evidence are provided.

Part I: High-Quality Preschools for All Children

There is not a single definition of high-quality preschool, and there is little conclusive evidence about the program characteristics that matter most (Barnett 2011). Nevertheless, there are elements generally considered to be part of a high-quality program. The California Department of Education (2010) and the National Association for the Education of Young Children (2005), for example, define "high quality" as including the following characteristics:

- Positive and productive teacher–child and home–school relationships
- Play as a context for learning
- Intentional teaching and integrated learning
- Responsiveness to culture and language
- Time for teachers to reflect and plan

A high-quality preschool has been identified in the research literature as having the following elements:

- Ratios of children to teachers of 10 to 1 or less, and class sizes of 20 or fewer students (Roopnarine and Johnson 2013)
- Family engagement and family literacy (Hammer, Scarpino, and Davison 2011)
- Age-appropriate materials available for exploration (Hirsh-Pasek et al. 2009)
- Ongoing assessment to support learning (Beltrán 2012)
- Qualified, responsive, skilled teachers (Castro, Espinosa, and Páez 2011)
- Emotional and instructional support and classroom organization (e.g., Pianta et al. 2005)

Not all approaches that are widely advocated have strong empirical evidence supporting them. For example, *cultural continuity,* sometimes referred to as *cultural responsiveness,* has traditionally been important for early educators. The assumption is that developmental stability and child outcomes (learning, social–emotional development, behavior) are enhanced when children can make more seamless transitions from their home cultures and experiences to early education settings. Indeed, there are many possible reasons why this continuity might be important for young children. However, there is limited empirical evidence supporting the benefits of "cultural continuity" or cultural responsivity on children's academic outcomes. There

is more evidence of the importance of connecting with children's "lived experiences"—that is, what they are familiar with based on their day-to-day lives rather than based on whether they are members of any particular cultural or ethnic group.

One challenge in this area is that the concept of cultural responsiveness has not been well defined: for example, does "culturally responsive" mean incorporating cultural traditions and celebrations, using social interaction patterns familiar to children, reading stories from children's cultural backgrounds, and making classrooms more like children's homes? Do only some of these features apply, or do all apply? In general, when teachers engage in culturally responsive practice, they make a concerted effort to learn from each family about languages spoken, patterns of communication, family stories, religious practices, music, household customs, the responsibilities of family members, and other important family practices that are an integral part of children's daily experiences (adapted from Derman-Sparks and Olsen Edwards 2010, 67). Although these practices make sense intuitively and may help children feel comfortable in a preschool setting, few data exist to show they actually influence child outcomes. (See Paper 4, Family Engagement, for further discussion of the importance of practitioners getting to know the children in their programs and in their own particular contexts.) However, use of the home language in preschool classrooms—which can be considered an aspect of cultural responsiveness—has been linked to positive outcomes for DLLs. We address this topic in the next section.

A review of the literature (Goldenberg, Rueda, and August 2006) on the influence of sociocultural factors on language-minority children's literacy development from preschool to high school (with relatively few studies including children below the age of five) concluded that the most that can be said from the research on cultural responsiveness is that although there are various differences between DLLs' home and school environments, the effects of attempts to be responsive to these differences in the classroom are not clear. Reading or using familiar materials or texts can improve reading comprehension among older students and literacy development more generally among younger students; however, "familiar" means familiar in the child's lived experience, not necessarily familiar in the sense that it is part of a cultural group's traditions (Goldenberg, Rueda, and August 2006). In one well-done preschool ethnographic study (Kenner 1999), for example, young DLL children's reading and writing development was supported by incorporating elements familiar to children from their homes and communities, such as letter-

writing to and from relatives, posters (e.g., from *The Lion King*), and recipes from a popular cooking program on television.

Despite an absence of clear evidence about what constitutes the most effective practices in early childhood education, preschool programs considered to be "high quality"—that is, sharing features such as those in the bulleted listed above—have been linked to a variety of positive short- and long-term outcomes (Barnett 2011; Camilli et al. 2010). Longitudinal research shows that children who participate in such programs have higher achievement, less grade retention, less involvement in special education, delayed parenthood, higher and consistent employment rates and, in some cases, reduced involvement with the criminal justice system in childhood and adulthood than children who did not participate in these types of programs (Schweinhart et al. 2005; Reynolds 1995). Effects of these programs are impressive across a range of outcomes: cognitive, social, and school-based (e.g., grade retention). Outcomes vary in effect sizes and the degree to which they persist from preschool to future grade levels.

Early childhood educators' perspectives have expanded to include explicit instruction along with traditional foundational principles that include child initiation, exploration, and play (see NAEYC 2009a and NAEYC 2009b for further information). The meta-analysis by Camilli and others (2010) found that direct instruction—or more generally, teacher-directed or explicit instruction—is associated with better child academic outcomes on specific knowledge and skills (e.g., letter knowledge, vocabulary words). Conversely, some early childhood practices have been questioned by research. For example, the same meta-analysis found that *fewer* additional services (e.g., health screening, home visits) are also associated with better student academic outcomes. Camilli et al. (2010) suggest that the explanation for the negative association between additional services and academic outcomes is that time devoted to these services was time taken away from a cognitive and academic focus. Provision of additional services was associated with positive social outcomes in some of the higher-quality studies (Camilli et al. 2010). Other factors that were not directly studied, however, might limit conclusions we can draw from this analysis. For example, levels of teacher qualification or resources devoted to children's learning experiences might differ in high- and low-service programs; if so, we cannot make strong conclusions about the effects of support services on child outcomes without also taking into account teacher qualifications and resources devoted to children's learning experiences.

Recent studies of effective preschool programs (Farver, Lonigan, and Eppe 2009; Jackson et

al. 2006) and supportive teacher–child interactions (Downer et al. 2012) have shown cognitive and social benefits for both young DLLs and monolingual English children. In Oklahoma, which has been one of the pioneers of universal high-quality prekindergarten, Latino children (nearly 70 percent of whom come from predominantly Spanish-speaking homes) have shown gains equal to or greater than their English-only counterparts when assessed in their emergent English abilities (Gormley 2008; Gormley and Phillips 2005). In other words, "generic" high-quality preschool appears to support the learning and development of young DLLs as well as monolingual English children.

An element of effective preschools that has been a traditional staple but has recently received increased attention from researchers is *play as a context for learning.* Although there is little research regarding the benefits of play for young DLLs, there is ample evidence that playful learning supports both cognitive academic and social–emotional development in preschoolers in general (see Johnson, Christie, and Wardle 2005; Singer, Golinkoff, and Hirsh-Pasek 2006). By allowing for children's exploration of materials, movement within the learning space, choices with regard to activities and engagement, interactions with peers, and conversations with adults (Hirsh-Pasek et al. 2009), playful learning is an approach to preschool that is consistent with developmentally appropriate practice (NAEYC 2009a). Furthermore, teachers can use playful learning to support particular learning goals and less structured learning (Fisher et al. 2010).

Although high-quality preschool may benefit young DLLs, it is unlikely to be *sufficient* for achieving equitable outcomes. For example, Collins (2005) found that children with lower levels of English proficiency learned fewer words from a vocabulary intervention than did children with higher English proficiency. Among school-age children,* reading interventions focusing on phonemic awareness, word recognition, and vocabulary tend to have comparable effects for DLLs (or English learners), but interventions aimed at improving reading comprehension in school-age children have not demonstrated comparable effects for students with limited English proficiency (August and Shanahan 2006).

Even when gains have been similar or better for DLLs compared with monolingual speakers of English, DLLs tend to begin with lower scores on a range of preliteracy assessments (e.g., Gormley 2008; Gormley and Phillips 2005). Although DLLs make *gains* equivalent to or greater

*Throughout the paper we will indicate when we refer to studies of school-age (K–12) dual language learners, who are typically referred to as *English learners*.

than those of their non-DLL peers, young DLLs begin preschool and still enter kindergarten with lower scores in English and Spanish. For example, Páez, Bock, and Pizzo (2011) report a gap between monolingual English-speaking children's and dual language learners' oral language skills that persisted through first grade. More generally, differences in children's academic and language skills at school entry—e.g., knowledge of numbers, number order, letters, words, beginning and ending sounds, vocabulary—predict academic achievement and achievement gaps among higher- and lower-achieving students through elementary school and beyond (Duncan et al. 2007). For example, longitudinal data show that children who enter kindergarten in the lowest 25 percent of math achievers are likely to remain in the lowest 25 percent in eighth grade (National Science Foundation 2010).

There are, of course, many factors that help explain this persistence of low achievement. But there is little doubt of the likely long-term consequences of differences in school-entry skills. These data suggest that determining and providing effective supports and supplements for DLLs is a matter of urgency. The need for additional supports and instructional enhancements are not solely due to English-language proficiency. The majority of young DLLs are Spanish-speakers *and* from low socioeconomic status (SES) homes. Low SES is itself a risk factor for poor academic outcomes, independent of the use of a language other than English in the home (Reardon & Galindo 2009).

We turn next to what research tells us about modifications intended not only to bolster but also to help accelerate young DLLs' learning and development in preschool. Although all children benefit from high-quality preschool, how do we further supplement high-quality environments for DLLs in order to support language, cognitive, and other developmental outcomes for these children? The use of children's home language in addition to English—often referred to as bilingual education—is probably the most important and most controversial issue in the education of DLLs, whether in preschool or throughout K–12. Part II addresses research on the use of the home language in preschool classrooms with young DLLs.

There is a limited but growing body of research about ways to support young DLLs' learning and development when classroom language and learning opportunities are almost entirely in English. These will be discussed in Part III. It is important to consider all-English or mostly English learning contexts, since most DLLs (and English learners) are not in school or preschool learning settings that make substantial use of their home language (Cannon, Jacknowitz, and

Karoly 2012; Goldenberg and Coleman 2010).

Part II: Language Use in the Classroom

Approaches to language use for young DLLs in preschool settings—as is true of language programs for English learners in elementary schools—vary along several dimensions. These dimensions include the goals for language development in the first and second languages, the types of instruction offered, and the instructional features of approaches to bilingual and English-only education. However, language program models in K–12 settings (e.g., see Center for Research on Education, Diversity, and Excellence 1999) have identifiable short- and long-term goals and, in principle, structured programmatic features aligned with those goals. In contrast, language use in preschool tends to be more dynamic, fluid, and spontaneous, making it more challenging to precisely characterize language program models just for preschool years. Nonetheless, we can identify three basic approaches to language use in the preschool classroom. These descriptions should not necessarily be considered recommendations, as the discussion that follows attempts to make clear.

- *English immersion programs*. All or mostly all instruction and teacher interactions are in English. The goal of these programs is English acquisition and development; there is no intent to develop children's home languages nor is the home language used to a significant degree to support children's learning. Children are not necessarily forbidden from speaking the home language, but its use is not encouraged nor actively supported. One advantage of English immersion programs is that they can accommodate children from many home languages. English immersion preschools, however, are not recommended by the California Department of Education (2009; 2010) and are not consistent with best practices based on research (see below).
- *Maintenance or developmental programs.* Such programs are at the opposite end of the spectrum. These programs use the children's home language and English extensively in the classroom. The goals are to (1) maintain and develop the home language and (2) help children to acquire and develop English proficiency. A preschool classroom might include all young DLLs from the same language background, or both young DLLs and children from English-only backgrounds. In the latter case, these are called *dual language programs*; their goal is to promote bilingual competencies for both young DLLs and their English-only peers.

- *Transitional programs.* Transitional programs lie between English immersion and maintenance programs. They use the home language to one degree or another, but the goal is not necessarily maintenance or further development of the home language. The home language is used to help children acquire concepts and content, learn how to function in preschool, and engage in all classroom activities. Children can also learn songs, rhymes, and games or participate in science lessons carried out in the home language, but the goal is generally to help children transition to an all-English classroom environment, if not in preschool then certainly in kindergarten and early elementary school.

The type of program model that is chosen may depend on the priorities of the school, community, and parents (e.g., are they aiming to promote bilingualism for children?) and the resources available at the school (e.g., are there teachers who can adequately speak the home language(s) of the children?). Program models may also depend upon the student population. Classrooms where all of the children speak the same home language (e.g., Spanish) are more conducive to maintenance or developmental programs than are classrooms with children from a number of home-language backgrounds.

Research has shown that instructional use of the home language—often referred to as bilingual education—does not hinder or stunt academic progress in English. On the contrary, there is evidence that teaching children to read in their home language can support their literacy development in English. In other words, when we systematically provide learning experiences in children's home languages along with learning experiences in English, we promote home-language development without hampering English development (Lightbown and Spada 2006). Five meta-analyses of bilingual education in elementary school have reached this conclusion (Goldenberg 2012). The most recent study has found that by the end of elementary school, children who have been in a bilingual program since kindergarten had much stronger Spanish skills, with no differences in English skills, compared with children who had been in an English immersion program (Slavin et al. 2011).

Similar results have been found for preschoolers: Classroom use of both the first language and English leads to improvement in first-language skills and at least equivalent English-language skills in comparison with children in all-English contexts (e.g., Barnett et al. 2007; Rodríguez et al. 1995; Winsler et al. 1999). Dual language preschool programming thus confers

the simultaneous benefits of maintaining and developing the home language while promoting English proficiency (Farver et al. 2009). In other words, bilingual education in preschool is additive rather than subtractive (Winsler et al. 1999), meaning that children benefit from a net linguistic gain: They maintain and develop their first language while beginning to acquire English skills. Home-language development does not appear to come at the cost of developing English skills. In sum, bilingual programs help students become bilingual—something that is valuable linguistically, cognitively (Bialystok 2001), and eventually economically (Saiz and Zoido 2005). The cognitive, linguistic, and social benefits of balanced bilingualism are covered in more depth in Paper 1, Neuroscience Research, and Paper 2, Development Across Domains.

A major question is whether DLL children benefit from English-only instruction to the same degree that they may benefit from a transitional approach that initially uses the home language and gradually moves the children to English-only instruction. There is some support in the research literature that a transitional approach and an English-only approach may produce similar results on English outcomes in the short term. Farver and others (2009) found that an English-only approach was as effective as a Spanish-to-English transitional strategy when a specific early literacy and learning intervention (Literacy Express) was used. However, although the English-only program used as the control group was of high quality, it did not provide comparable outcomes in Spanish for young Spanish-speaking DLLs.

Barnett and others (2007) found that although children in high-quality preschool programs in Two-Way Immersion *and* children in high-quality English Immersion showed substantial gains in language, literacy, and math, the Spanish speakers in the two-way immersion program made greater gains in Spanish than their English-only counterparts without losses in English language development. In a study that compared English-only instruction with a transitional approach with Head Start children, Durán, Roseth, and Hoffman (2010) found no differences between English-only instruction and instruction that included some Spanish on English language and literacy scores, but the children who experienced instruction in Spanish had higher scores on Spanish vocabulary and letter–word identification at kindergarten entry.

It appears, then, that English-only instruction in preschool is a detriment to Spanish development without providing an added boost to English development. However, Vitiello, Downer, and Williford's (2011) multistate preschool study found that more instruction in Spanish was associated with a lower chance of attaining English proficiency at the end of two

years, particularly for children who enter preschool with very low English proficiency. Since this was not an experimental study, we cannot make strong causal inferences. But the findings do suggest that at some point, use of the home language might preclude sufficient exposure to English. Therefore, as important as providing home-language learning opportunities may be for young DLLs, so is providing adequate exposure and learning opportunities in English. Language researchers have estimated that in order for preschoolers to learn to speak a language, children must spend between 20 and 30 percent of their waking hours hearing and speaking the language (Pearson et al. 1997).

In classrooms that score high on generic measures of quality (as measured by the CLASS, which we will address in more detail later in this paper), Spanish-speaking children's academic skills (in both English or Spanish) were higher when they received more instruction in Spanish (Burchinal et al. 2012). In a recent summary of related research, Espinosa (2010) concluded that the best evidence available points to the value of early reading instruction in the home language and in English contributing to successful reading development in English. Espinosa goes on to describe other studies of programs that used a 50-50 English–Spanish bilingual approach with young learners and found that young children were able to develop English skills on par with their monolingual English-speaking peers while also continuing to develop their Spanish skills (Barnett et al. 2007; Rodríguez et al. 1995; Winsler et al. 1999).

High-quality bilingual preschool instruction appears to support development in both the home language and in English. What we do not yet know are specifics about which approach to bilingual instruction works for whom, when, and how. Winsler and others suggest that research should shift its focus to "[w]hich types of early bilingual educational contexts promote or constrain the development of balanced bilingualism in which type of communities" (Winsler et al. 1999, 360). In fact, advantages for dual language learning appear to be associated with developing proficiency and competency in both languages and thus providing DLLs with high-quality interactions in both languages. This is important in order for them to experience the cognitive and social advantages of balanced bilingualism; see Paper 1, Neuroscience Research, and Paper 2, Development Across Domains, for further discussion. In the meantime, decisions about approaches to bilingual education for preschool DLLs must be made with children, staff, families, and communities in mind.

Bilingual instruction with the goal of biliteracy and bilingualism is not possible in many contexts. In schools and classrooms where English immersion is the only feasible option, there are ways that teachers can still bring the home language into the classroom that might contribute to helping children experience home–school continuity, provide opportunities for continued use of the home language, and encourage parents to continue developing children's native language skills. Researchers and early educators have suggestions for how teachers can include home languages in the preschool classroom (California Department of Education 2010; Goldenberg, Hicks, and Lit 2012; Castro et al. 2006):

- Read to children from books in the child's home language. This can be done by teachers, families, or community members, and books can be obtained from local libraries, children's homes, or made in the classroom and saved from year to year.
- Create books that include children's home languages. These can be class books (about animals, for example, where each animal is labeled in all of the classroom's home languages) or individual books (e.g., about children's families, with many words or labels in the home language).
- Teach children rhymes, letters, and numbers in their home language. Community or parental support may be required. If there are adults in the preschool who speak the child's home language, ensure that there are opportunities for those adults and children to interact.
- Teach all of the children in the class the greetings of all of the home languages in the classroom.
- Summarize or provide key phrases of a story in a book, finger play, or song in the child's home language before introducing it in English.
- Point out cognates (words in two languages that have common roots, e.g., *elephant* and *elefante*; *giant* and *gigante*) and connections between words in the home language and words in English.
- Let parents know what topics are going to be explored in the classroom (e.g., insects, weather) so that families can build concept knowledge in the home language before children are exposed to those concepts in English.

- Set aside time and space for adults who speak the child's home language to interact with children in that language. In the elementary classroom, this takes the form of a separate block of time set aside for native language instruction (Restrepo et al. 2010).
- Use home languages in helping to design the preschool environment (e.g., when labeling furniture and parts of the room) and have available print materials in children's home languages.

The specific academic and social benefits of all-English instruction, coupled with bringing the home language into the classroom, are unknown. Future research is needed to study these areas.

PART III: Teaching Practices for Preschool Dual Language Learners

Quality of Instruction. Measuring quality in preschool is challenging. Preschool educators typically consider many aspects of child development (e.g., social–emotional and physical) and the in-program and out-of-program factors that influence development, such as the family. There is less overt and concentrated focus on academics in ways that are more typical for older children beginning in elementary school. Measures of early childhood program quality have accordingly tried to gauge a range of program qualities thought to influence the many dimensions of child development, such as interactions with peers, feelings about school, independence, and persistence (e.g., NAEYC 2009a; Stipek et al. 1998). Program qualities that are measured include positive affect in the classroom, responsiveness of teachers, and support for students' autonomy and leadership (e.g., Pianta, La Paro, and Hamre 2008).

The Classroom Assessment Scoring System (CLASS) (Hamre and Pianta 2007) is a relatively recent measure of preschool quality used in Head Start classrooms in the United States and has been used for standardized observations in the largest number of preschool and elementary classrooms (Hamre et al. 2007). "The Early Childhood Environment Rating Scale (ECERS) assesses a program's interactions, activities, and routines, in addition to focusing in detail on the resources of the program's physical environment and their effective use (Harms, Clifford, and Cryer 2005)" (California Department of Education forthcoming, Chapter 5). The forthcoming CDE publication *California Preschool Program Guidelines* states, "Research with the Early Childhood Environment Rating Scale (ECERS) (Sylva et al. 2010; Peisner-Feinberg et al. 2001) and the Classroom Assessment Scoring System (CLASS) (Howes et al. 2008; Mashburn et al. 2008) indicate that both the physical environment and the social and emotional climate of a program influence its overall quality" (California Department of Education

forthcoming, Chapter 9.8). In addition, the CLASS instrument has identified three dimensions of teacher–child interaction quality: Emotional Support, Classroom Organization, and Instructional Support. Classroom dimensions measured by CLASS appear to be consistent indicators of teacher–child interaction quality regardless of whether students are young DLLs or English-only speakers (Downer et al. 2009; Vitiello et al. 2011).

In a study of center-based preschools in California, Cannon, Jacknowitz, and Karoly (2012) found mixed results on measures of preschool quality on the CLASS. Whereas all linguistic subgroups of California children—including young DLLs and native speakers of English—were in classrooms that scored at "moderate" or above for dimensions of Emotional Support and Classroom Organization, all subgroups had a mean score indicating low levels of quality for Instructional Support of learning. This is of concern for all children because this is the domain that captures opportunities for deeper-level thinking. But low scores are of particular concern for young DLLs because these indicators gauge the sort of environment that classrooms provide for children's language development (Cannon, Jacknowitz, and Karoly 2012).

Quality of Relationships. The quality of preschool for young DLLs does not end with the richness of the instruction itself. Teacher–child relationships appear to be important to academic outcomes as well. Teachers' attention to individual academic and emotional needs appears to be related, in particular, to successful mathematics development (Vitiello et al. 2011). More specifically, Spanish-speaking children who are taught in Spanish in emotionally supportive classrooms make larger gains in math scores than do their peers in less emotionally supportive classrooms (Vitiello et al. 2011). According to Pianta and others (2008), high-quality relationships between children and teachers require teachers to establish the following practices in their classrooms:

- Teachers are physically proximate to children, they engage in social conversation with children, and provide verbal and physical affection.
- Teachers use a warm, calm voice, make eye contact, and use respectful language when talking with children.
- Teachers are flexible with children and allow children to make choices and express themselves.

Chang and others (2007) studied teachers and children in 161 preschool classrooms across the United States that were populated by half English-speaking monolinguals and half Spanish-

speaking young DLLs. In those classrooms, the less Spanish the teacher knew and used, the more likely she was to rate the behavior of the Spanish-speaking students as challenging, and the less likely she was to converse with them. Teachers who spoke some Spanish to the children viewed children's behavior in a more positive light. The researchers suggest that having preschool classes with young DLLs that were taught by English-only teachers may contribute to the achievement gap. The findings of this study highlight the value of home language support not only for academic benefits, but also for social and emotional benefits as well.

Language and Literacy Development. In general, Spanish-speaking children begin preschool already behind their monolingual peers on measures of emergent literacy, letter identification, and phonological awareness (Páez, Tabors, and Lopez 2007). Furthermore, children who receive no special language training are at greater risk of falling behind as content matter gets more complicated in upper elementary and beyond (Lindholm-Leary 2012).

However, children with a strong foundation in language and literacy skills in Spanish are better able to transfer those skills to English than children with a weaker foundation in Spanish language and literacy (Lindholm-Leary and Genesee 2010). Lopez and Greenfield (2004) found that Spanish and English oral proficiency and phonological awareness in Spanish were predictive of phonological skill development in English. More recently, Gorman (2012) has shown that teaching kindergartners phonemic awareness skills in Spanish produces gains in phonemic awareness when they are measured in English. Building first-language literacy skills in preschool not only helps the child to develop that language but also provides valuable tools for learning to read in English (Lee 1996).

Helping DLLs develop greater vocabulary skills is, of course, an important goal. In a study of 80 young preschool DLLs, Collins (2009) found that rich explanations of target vocabulary, coupled with frequent home reading and higher initial vocabulary in English, made significant contributions to the learning of sophisticated vocabulary from story reading. In Collins' study (2009, 93) of Portuguese-speaking students, vocabulary support and instruction included five elements: (1) gesturing, (2) defining, (3) using a decontextualized statement, (4) providing synonymous phrases, and (5) pointing to illustrations. "[R]esults show that there is no minimum level of receptive knowledge necessary before children benefit from exposure and word support. Explanations are helpful regardless of initial L2 (second language) vocabulary levels" (Collins 2009, 94).

Whereas Collins' work made it a point not to use words with English cognates, thereby examining the power of vocabulary support without that particular scaffold, earlier work with school-aged children by August and others (2005) suggests that taking advantage of cognates can be of value in vocabulary instruction. However, taking advantage of cognates is possible only for languages with common roots such as English and Spanish; except for anglicized words, English does not have cognates in non-European languages. Additionally, embedding Spanish explanations of English vocabulary words during storybook reading has been shown to produce greater gains than support that is given solely in English (Lugo-Neris, Jackson, and Goldstein 2010). Finally, interactive reading, or "dialogic reading," can promote vocabulary and other language skills (Whitehurst 1992). Interactive or dialogic reading is a strategy that engages children in discussions of texts. Teachers access children's prior knowledge about the concepts and vocabulary in the text, ask questions throughout the text, and encourage discussion of the content and themes. Although children can learn a great deal simply from exposure to comprehensible language, research has shown that guided instruction—such as explicit vocabulary support—is important for DLLs to make further progress in language development (Lightbown and Spada 2006).

Evidence from the Early Authors Program—in which preschool DLLs, their parents, and their teachers worked together to create books ("identity texts") in which the children themselves were the protagonists—demonstrates significant gains in children's language and cognition scores. The authors hypothesize that these gains were a result of cognitive engagement and the development of an affective bond to literacy. The authors go on to point out that although many of the more than 1,000 students in the study had the potential to experience serious learning difficulties in their schooling (as more than half of low SES children of color in the United States do), this intervention seems to have reduced some of the initial achievement gap that is associated with those learning difficulties (Bernhard et al. 2006).

Additional Scaffolds for Dual Language Learners. In all-English instructional environments, modifications useful for older children may also support preschoolers' concept and language development. Sometimes these modifications are grouped under the general heading of "sheltered instruction" (see Echevarria, Vogt, and Short 2008), often called "specially designed academic instruction in English" (SDAIE) in California. They include strategies such as explicitly teaching language along with content; using visuals such as pictures and real-world

objects to clarify terms and concepts; graphic organizers such as Venn diagrams, tables, and charts; and providing concrete experiences such as preparing food or engaging in other authentic experiences (e.g., visiting the school office, field trips in the community) to offer meaningful contexts for learning activities. Sheltered instruction was developed for older students learning explicit academic content, but there is evidence that some of these practices, including the following examples, are also effective for young DLLs:

- Using pictures of vocabulary words to illustrate word meanings (Roberts and Neal 2004)
- Using hand puppets and game-like activities to illustrate concepts and actions and to engage children physically (Pasnak et al. 2006)
- Offering multimedia-enhanced instruction in the form of videos to enhance vocabulary instruction with nonfiction texts (Silverman and Hines 2009)
- Using materials with familiar content to promote comprehension and facilitate learning new concepts and skills (Kenner 1999)

The principal point is that students who are learning content in a language they are simultaneously learning to speak and understand probably need additional supports to make the content comprehensible to them. Teachers must therefore consider using modifications, such as interactive approaches targeting both content and language; graphics, illustrations, and other visuals; direct teaching to help students learn skills and concepts; material with familiar content (in addition, of course, to teaching new content); and using the home language to support concept and language development (see Part II, Language Use in the Classroom).

Attempts to incorporate additional supports, such as the ones referenced above, into comprehensive programs and curricula have had mixed success. For example, a professional development that succeeded in having early childhood educators add scaffolding strategies for DLLs into their core practices found that the improvements in child outcomes were limited to some phonological awareness measures (Buysse, Castro, and Peisner-Feinberg 2010). Although what we know in general about effective instruction is a necessary foundation of effective instruction for English learners of all ages, "generic" effective instruction is probably not sufficient to promote accelerated learning among young DLLs. We have some intriguing clues about what else is needed to make programs effective for English learners, but there is little certainty about how to incorporate these supports into programs that will optimize developmental outcomes for DLLs.

English Language Development (ELD) Strategies in Preschool. Research on ELD strategies has focused on elementary school and beyond. According to Saunders and Goldenberg (2010), two critical elements of ELD instruction for older children are explicit instruction in features of the second language and ample opportunities to use that language in situations that are both motivating and meaningful. What does this mean for preschool? Although the research on ELD instruction in preschools is scant, one implication is that teachers need to allocate time and space for intentional interactions aimed at promoting English language use and development.

In one kindergarten study, a separate block of time devoted to ELD instruction for English learners led to somewhat better outcomes, compared with having ELD "integrated" into language arts or other content instruction (Saunders, Foorman, and Carlson 2008). In another study with kindergarten and first-grade children, storytelling and retelling and academic oral language activities and lessons were shown to be effective in helping accelerate DLLs' English language development (Tong et al. 2008). In the preschool context, this might take the form of intentional individual and small-group interactions with young DLLs rather than as a separate block of time for the entire class or groups of children.

The following strategies, some of them similar to those suggested when children are in all-English programs, might also help promote English language development among young preschool DLLs (see California Department of Education 2010; Garcia and Jensen 2007; Gillanders and Castro 2011; Goldenberg, Hicks, and Lit 2012; Lightbown and Spada 2006):

- Some explicit teaching (or explanations) of features of English, such as vocabulary and pragmatics
- Scaffolding language with sentence frames
- Connecting the home language to English
- Engaging the whole body in learning
- Learning and practicing rhymes, poems, and songs, particularly those with repetitive refrains
- Pairing DLLs with children who have higher and lower levels of proficiency in English as supports for each other, and occasionally presenting tasks for those pairs to complete that do not depend on language proficiency
- Providing safe havens where children do not have to speak to anyone and spaces in the classroom where children can interact in small groups and one-on-one

- Using manipulatives, illustrations, and gestures
- Retelling and dramatizing stories children have heard several times
- Providing linguistically and culturally representative materials and a listening library in both English and the home language

Conclusion

Whether they learn English, another language, or multiple languages, all preschool children are language learners (Severns 2012). Preschools should, of course, provide a rich language-learning environment in which all children have language models, intentional exposure to and support for language and concept development, and extensive opportunities to build children's language competencies. More broadly, high-quality early childhood education—which necessarily includes a rich language-learning environment—is the foundation of good practice for all children. Skilled, responsive teachers who facilitate children's learning across the preschool curriculum within organized environments are beneficial for young DLLs no less than for children growing up in a one-language environment. Classrooms that use play as a basis for learning and offer ample opportunities for social and emotional development are also beneficial for all children (Hirsh-Pasek et al. 2009).

In order for preschool to be *optimally* beneficial for young DLLs, however, additional supports must be in place. We cannot determine whether there is one best way to bolster young DLLs' outcomes, but several program elements seem to be beneficial or at least offer considerable promise:

- Bilingual preschool appears to support young DLLs' language and academic development. The best evidence available suggests that high-quality bilingual preschool education contributes to the development of both languages and to academic skills. Teachers undoubtedly need to have adequate language skills so that they can engage meaningfully and extensively with children in whatever language is used. However, we know of no direct research on this issue, nor do we know with any precision what would constitute "adequate" language skills.
- Young preschool DLLs also require adequate exposure to English, although again we cannot say precisely how much is adequate. Use of the home language and use of English are in no way mutually exclusive; both should be used to support children's growth and development.

- If bilingual preschool is not an option, the inclusion of some home language supports—such as books in the home language, previewing key vocabulary terms in the primary language, pointing out cognates from the home language (when this is possible and when English and the home language share a common ancestral language, such as Spanish and English), and involving families and other community members in the classroom who speak the home language—can support young DLLs.
- DLLs in English contexts require additional supports (e.g., concrete experiences to make learning more meaningful, building on familiar content, explicit connections with experiences out of school, visuals or multimedia tools to make concepts more concrete and comprehensible—in addition to typical preschool learning strategies such as songs and rhymes, ample physical activity, and use of manipulatives).
- Adequate time to interact with English-speaking adults and peers throughout the day and in different contexts is beneficial to DLLs.
- Like monolingual English-speaking children, DLLs benefit from intentional development of vocabulary and other language skills, pre-reading skills (e.g., phonological awareness, letters) and math skills (e.g., numbers, number order).
- An emotionally supportive environment is important for young DLLs so that as they try out a new language, they feel safe as they take risks and make mistakes.

Although we cannot specify with great certainty all aspects of effective preschool practices for young DLLs, the parameters for creating high-quality programs are beginning to emerge. These programs should have practices that have been found to be effective for preschoolers in general as the base. In addition, children's home language should play a prominent role in high-quality DLL programs—not to the exclusion of English, but as an additional resource to promote language and cognitive growth more fully. To provide this level of home language support, program directors need to enhance their efforts to recruit, hire, and retain staff representing the cultures and languages of the children and families enrolled. All staff members will also need ongoing professional development on how to support the early learning and development of young DLLs. To the extent that learning experiences are mostly in English (not optimal, but sometimes unavoidable if qualified staff members are not available), additional supports must be provided to all teachers regardless of their language backgrounds or skills so that these experiences are meaningful and understandable to children. Academic and pre-academic skills

(language, reading, and math) are targeted, but not to the exclusion of open-ended and play-based opportunities that provide children latitude in choices and activities. Finally, effective DLL programs provide a supportive but stimulating learning environment where children will be encouraged to explore and expand their growing repertoire of language, cognitive, and interpersonal skills.

As a whole, these program elements represent the best of the knowledge we possess for educating young DLLs. Programs designed around these elements are the most likely to provide the strongest possible foundation for children's success in kindergarten and the rest of their school years.

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Paper 4

Family Engagement in Early Childhood Programs:

Serving Families of Dual Language Learners

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Dual language learners (hereafter called DLLs) are the fastest-growing child population in the United States. Between 1994 and 2010, the number of DLLs in prekindergarten (Pre-K) to grade twelve has grown approximately 64 percent, whereas the total number of children overall in kindergarten to grade twelve has grown approximately 4 percent (National Clearinghouse for English Language Acquisition 2011). The State of California, in particular, leads the nation in the number of DLLs (Shin and Kominski 2010). The percentage of DLLs served by California's kindergarten-to-grade-twelve educational system is double the nation's average (Migration Policy Institute 2010), and half of the total number of preschoolers in California are DLLs (Cannon, Jacknowitz, and Karoly 2012; Fortuny, Hernandez, and Chaudry 2010).

The numerical growth of DLLs has occurred predominantly among younger children (National Center for Children in Poverty 2010) and is reflected in early childhood education (ECE) programs, such as Head Start, where 30 percent of the children served nationwide are DLLs (Office of Head Start 2011). A disproportionate number of children who are DLLs come from low-income households (Fortuny, Hernandez, and Chaudry 2010). DLLs who have been educated in American schools since preschool are consistently outperformed by their peers on achievement tests, and the gap widens at higher grades (Batalova, Fix, and Murray 2007; Cannon and Karoly 2007; Espinosa 2007; Hammer et al. 2009; Lee and Burkham 2002; Páez, Tabors, and Lopez 2007).

Importantly, recent research on early cognitive development points to the importance of preserving and strengthening home-language use for DLLs. Using the Early Childhood Longitudinal Survey—Birth Cohort (ECLS-B), Winsler et al. (N.d.) examined a national sample of children between ages nine and 24 months and their mothers (who ranged in immigration status). In their analyses, the authors controlled for country of origin and family demographics, such as income and education, and found that, in families with immigrant mothers, young children who were from homes in which only the heritage language was spoken outperformed their peers in early cognitive and preschool math skills. These peers included children of immigrant parents who spoke only English at home and those who spoke two or more languages (including English) at home. Thus, heritage-language use in the home may serve as a protective factor for early cognitive development and math skills for children of immigrants between the ages of nine and 24 months. These findings suggest the urgent need for early childhood

professionals to partner with DLL families in preserving heritage language use in the home for children whose parents are immigrants. Heritage language use will promote important academic-related skills needed for school entry. Program elements and teaching practices that support young DLLs are discussed in greater detail in Paper 3, Program Elements and Teaching Practices, and the cognitive, linguistic, and social benefits of bilingualism are discussed in Paper 1, Neuroscience Research, and Paper 2, Development Across Domains.

Family Engagement

Family engagement with schools has been linked to important outcomes for children of all families, including families with children who are DLLs. Numerous positive developmental child outcomes have been associated with family engagement, including early literacy skills (Durand 2011; López, Barrueco, and Miles 2006), cognitive and language development skills (Fantuzzo et al. 2004; Farver et al. 2006; Raikes et al. 2006), social–emotional skills (Fantuzzo et al. 2004), and academic achievement (Jeynes 2012; Lee and Bowen 2006; LeFevre and Shaw 2012; Lin 2003, 2006; Mantzicopoulos 2003; McWayne, Fantuzzo, and McDermott 2004; McWayne et al. 2004; Suizzo et al. 2012). Families have also been shown to serve a critical role in the preservation of their language and culture (Phinney et al. 2001; Schwartz 2010). Thus, a focus on strengthening DLL family engagement in ECE programs may play an important role in reducing the achievement gap. Strengthening DLL family engagement in preschool may be especially important, since the early years of development set the foundation for future learning, and since families who are engaged early on with schools are more likely to maintain engagement across future educational settings (Ou 2005; Weiss, Caspe, and Lopez 2008).

This paper will review research on family engagement and its impact on the well-being of children who are DLLs. In general, the research literature highlights two important findings:

(1) Strong connections between DLL families and schools are associated with important benefits for preschool-age and school-age children (Durand 2011; Fantuzzo et al. 2004; Jeynes 2012; Lin 2003).

(2) DLL families participate in their children's educational programs at lower rates than families whose members are not DLLs (McWayne, Campos, and Owsianik 2008; Wong and Hughes 2006). However, this body of literature includes few empirical studies, uses vague

definitions of family engagement, and does not consider the unique challenges DLL families face when interacting with educational programs. Furthermore, a fairly large body of research on family engagement has focused on students in kindergarten to grade five, while relatively few studies have focused on preschool-age children. Since findings on children in kindergarten to grade five are relevant to preschoolers, we will include these children in this review and will identify throughout the paper the age group associated with each study.

Terminology and Definitions

In general, young DLLs are children in early education settings who must learn to comprehend, communicate, and read in a language that differs from the language primarily spoken in their home. Most young DLLs are U.S.-born children of immigrants, but may also include children of U.S.-born parents. In California, 50 percent of four-year-olds are children of immigrant parents, and 20 percent of these children live in linguistically isolated households (Cannon, Jacknowitz, and Karoly 2012). DLLs in California who are five years and older are most likely to come from homes whose members speak Vietnamese, Spanish, Korean, and Tagalog (Shin and Kominski 2010). Nationally, the DLL-student population has become increasingly segregated; 70 percent of DLL students in kindergarten through grade five are enrolled in 10 percent of the nation's elementary schools, the majority of which are high-poverty schools with a shortage of trained teachers and appropriate materials (Arias and Morillo-Campbell 2008).

We use the term *family engagement*, as opposed to *parental involvement* and *parent education*, because it more accurately represents the multigenerational families of children who are DLLs. Children in immigrant families are nearly twice as likely to live with grandparents, other extended family members, and nonrelatives than children in native-born families (Hernandez, Denton, and McCartney 2008). Thus, the term *family* is a more inclusive term that encompasses biological, nonbiological (for example, fictive kin, *compadres*), and extended family members (for example, aunts, uncles, and grandmothers), all of whom participate in the DLL's upbringing and who may serve as resources to support children's learning in and out of the preschool program. In addition, the term *engagement* suggests a strength-based perspective toward families. Terms such as *involvement* and *education* imply a one-way, power-laden relationship between families and programs in which programs are clearly perceived as holding

more wisdom about children than the family does. In contrast, the term *engagement* recognizes that family members of DLLs have a wide range of inherent interests and skills to contribute in a two-way relationship, and it challenges teachers to identify and engage those interests and skills in ways that maximize children's learning (Halgunseth et al. 2009).

Several definitions of *family engagement* exist in the literature. Weiss, Bouffard, Bridglall, and Gordon (2009) have defined *family engagement* as the promotion of shared responsibility between families and educational programs that continue across the child's life span and encompass multiple settings, such as home, programs, schools, church, and communities. In addition, based on their review of the broader family-engagement literature, beyond simply family engagement with DLL families, Halgunseth et al. (2009) developed a definition of *family engagement* in which six characteristics are evident:

- **Joint decision making.** Programs and DLL family members equally participate in child-related decisions, such as sleeping schedules or discipline-related issues.
- **Regular two-way communication.** Programs and DLL families regularly listen to and share information with one another, such as DLLs' daily challenges and achievements.
- **Collaboration and exchange of knowledge.** Programs and DLL families collaborate and exchange their knowledge on DLL learning styles and abilities.
- **Learning in home and in the community.** Programs and DLL families reinforce the learning and application, across school, home, and community settings, of (a) new concepts, such as recognition of shapes and colors; or (b) English terminology for concepts (for example, the color *rojo* in Spanish is the color *red* in English).
- **Joint family–program goal setting.** Programs and DLL families develop and agree upon learning goals—such as sharing, cooperation, language development, or literacy-related skills—for DLLs.
- **Professional development.** Programs develop an ongoing and comprehensive professional development system that helps teachers to engage DLL families in children's learning across school, home, and community settings.

Unlike many families, DLL families face unique obstacles that may hinder their engagement in their children's educational programs (Arias and Morillo-Campbell 2008). This paper reviews those obstacles, as well as the theory, research, and best practices for ECE programs that seek to engage DLL families. Based on this review, specific recommendations will be made that pertain to preschool practices in California.

Mismatch and Obstacles

Researchers have documented a mismatch of expectations between DLLs' family beliefs and school expectations (Arias and Morillo-Campbell 2008; De Gaetano 2007; Ramirez 2003; Quiocho and Daoud 2006; Valdés 1996; Valencia and Black 2002). The disparity may lead to miscommunications, misunderstandings, and misconceptions between teachers and family members, which weakens the program–family partnership and may impede children's learning. Reconciling areas of miscommunication and misperceptions between the DLL educational programs and the families may provide a supportive, positive context in which DLL children can learn and develop.

Teacher perceptions that DLL family members are not interested in their children's education are well documented in the literature (Lightfoot 2004; López 2001; Olivos 2004; Valdés 2001). For example, Arias and Morillo-Campbell (2008) found that staff members in educational programs are more likely to hold the following beliefs: (a) equate low DLL parental participation with a lack of interest in their children's education rather than consider other reasons for low participation, such as the program's deficiencies in engaging DLL families; and (b) perceive DLL families as the reason for DLL children's low academic progress. Quiocho and Daoud (2006) found similar perceptions in interviews with teachers from two Southern California elementary (kindergarten to grade five) schools. In interviews, teachers expressed a belief that DLL Latino families were unreliable, unskilled, and unsupportive of the school's policies and did not care about their children's education. They based their opinions on past experiences in which DLL families did not volunteer in the children's classrooms, did not help their children with their homework, and would take their children out of school during the school year to visit family in Mexico.

However, researchers who interview DLL families find that DLL family members express great aspirations for their children's education and a hope that their children will excel further in school than they the parents had (Delgado-Gaitan 1992; Fuligni and Fuligni 2007; Pew Hispanic Center and Kaiser Family Foundation 2004; Spera, Wentzel, and Matto 2009; Suizzo et al. 2012). DLL families have also indicated a strong interest in helping their children with homework (Chavkin and Williams 1993; Quiocho and Daoud 2006) and have reported implementing nontraditional strategies that they believe support their children's education, such as the following:

(a) Ensuring that their children go to bed early and are on time for school

(b) Emphasizing to their children that they should respect and obey their teachers and get along well with their classmates

(c) Reminding their children to do their homework at home

(d) Engaging in thoughtful discussions with their children in which they convey *consejos* (words of wisdom) on the importance of education in life (Arias and Morillo-Campbell 2008; Delgado-Gaitan 1992; López 2001; Quiocho and Daoud 2006; Ramirez 2003; Valdés 1996; Valencia and Black 2002)

The disparate perceptions between teachers and DLL families on the "value" of education have been explained in several ways. First, definitions of family engagement may differ between schools and families (Arias and Morillo-Campbell 2008; De Gaetano 2007). Teachers tend to use the traditional paradigm of family involvement, which has been criticized by some researchers for its limited range of opportunities for parents to be involved (López 2001). Traditional strategies may include family members' participating in bake sales, serving on a parent-advisory board, and leading a class activity. Family members who attended and completed school in the United States may understand and participate in these practices; however, for DLL family members who were not raised in American schools, these practices may seem new or foreign and thus may hamper the extent to which they participate (Arias and Morillo-Campbell 2008; López 2001; Valdés 1996). In addition, the labor-intensive work schedules of immigrant families may prevent them from participating at the school during the school day (Arias and Morillo-Campbell

2008; McWayne, Fantuzzo, and McDermott 2004; Ramirez 2003), and this may contribute to the misperception that they are "uninvolved" (McWayne, Campos, and Owsianik 2008; Sosa 1997).

Second, the traditional family involvement model often does not recognize informal strategies that promote children's learning, such as engaging in discussions on the importance of a strong work ethic, storytelling, and teaching the DLLs about their ethnic heritage (López 2001). According to the traditional model of family involvement, families demonstrate investment in their children's education when they take part in traditional parent-involvement activities, such as fund-raising or chaperoning events. Caution should be taken by programs in assuming this viewpoint, as it may promote a deficit view of nontraditional practices of DLL family engagement and may disproportionately mischaracterize many DLL families as "uninvolved" in their children's education (Arias and Morillo-Campbell 2008; De Gaetano 2007; López 2001; Ryan et al. 2010; Valdés 1996). Clearly, all families, including DLL families, care about their children's education and academic success, and traditional views of parent involvement (for example, volunteering) are not the only indicator of parental investment in their children's education (López 2001).

Third, linguistically diverse families may experience unique obstacles that hinder their interaction with their children's schools. Ramirez (2003) conducted a study in a predominantly Latino community in Southern California where the author asked DLL Latino family members about the relationships with their children's schools. The lack of linguistically diverse staff in the schools emerged as a major obstacle for DLL families. DLL families felt uneasy entering schools because they could not express themselves in their native language and described experiences in which school staff would "talk down to them" because of their lack of proficiency in English. Some DLL Latino family members reported instances in which they attended school board meetings but could not express themselves because of a lack of interpreters (Ramirez 2003). These findings may explain why Spanish-speaking parents report lower levels of communication with schools compared with English-speaking parents (Wong and Hughes 2006).

In their study, Sohn and Wang (2006) interviewed six Korean immigrant mothers whose children were between preschool and fourth grade on their perspectives of parental involvement in American schools. Regardless of how many years they had lived in the United States, all of

the Korean-immigrant mothers believed the language barrier was the primary obstacle in their interactions with their children's schools. The mothers recalled instances of embarrassment when their use of English was not understood by teachers or when teachers became impatient or irritated with the mothers' attempts to communicate in English with teachers. Because of these experiences, the mothers in the study became reluctant to participate in American schools and became reticent and passive in their communication with teachers. Likewise, other researchers have reported the finding that the inability to communicate with school staff is a barrier to family engagement for newly arrived immigrants with limited English skills (Arias and Morillo-Campbell 2008; Chavkin and González 1995; Lee 2005; Ortiz 2004).

Fourth, cultural norms between typical public schools and families of DLLs may also explain some of the mismatch in perceptions. Arias and Morillo-Campbell (2008) explain that DLL families often struggle with culture shock and may see the educational setting in the new country as foreign, confusing, or intimidating. The experiences may lead DLL families to limit their interactions in this environment. For example, collectivistic versus individualistic norms may explain a cultural mismatch of understanding between educational programs and DLL families. In collectivistic cultures, the goal is to promote harmonious interactions and to treat others with respect (Arias and Morillo-Campbell 2008; Trumbull, Rothstein-Fisch, and Hernandez 2003). As such, some DLL family members have reported that they do not speak in board meetings or contact teachers unless they have been invited to speak or share their opinions (Durand 2011; Lareau and Shumar 1996; Ramirez 2003; Valdés 1996). A study by Sohn and Wang (2006) helps to illustrate this point. In their study, immigrant Korean mothers of children ranging from preschool to fourth grade reported confusion over their roles in the educational program. In Korea, families defer opinions and suggestions about children's education to teachers as a demonstration of respect for teachers' expertise and authority. Family visits to schools are limited to occasions when children misbehave or receive poor grades. Several mothers voiced confusion and reticence about assuming a different role in their relationship with teachers. Thus, for DLL families, contacting teachers without an invitation from them may violate collectivistic cultural norms and beliefs.

Fifth, DLL family engagement may be influenced by issues related to the parents' educational histories. Some DLL family members have completed only a limited number of

years of school because of financial hardship, lack of access to schools in their native country, or personal struggles with learning. Such limitations may influence how much school-related guidance they can offer their young children and how comfortable they feel leading classroom activities or interacting with schools (Lareau and Shumar 1996). In their review of the literature, Arias and Morillo-Campbell (2008) found that limited parental schooling was often a source of embarrassment for parents and caused them to feel intimidated by interactions with instructional staff. Feelings of intimidation may, in part, explain why McWayne, Campos, and Owsianik (2008) and Fantuzzo, Tighe, and Childs (2000) have found that parents with low incomes and low education levels reported significantly less contact with school teachers and staff.

Lastly, some DLL families report that educational programs are simply unwelcoming (Arias and Morillo-Campbell 2008) and treat differently those families who are not fluent in English. In a qualitative study conducted by Ramirez (2003), DLL Latino family members reported that some teachers told children that parental contact and questions were not welcome. Also, some DLL families believed that teachers were more liberal in assigning suspensions and penalties to DLL children in the classroom and felt less of a need to discuss disciplinary decisions with DLL families. This practice made some DLL family members feel that teachers were not interested in their input, and they feared that they would only anger teachers and promote an increase in their negative attitudes toward DLLs if the family members questioned or voiced their concerns to teachers. Like Ramirez (2003), other researchers have found that language-minority parents report feeling unwelcome at their children's schools (Martinez, DeGarmo, and Eddy 2004; Quezada, Diaz, and Sanchez 2003), which may help explain low levels of program interactions among language-minority families (McWayne, Campos, and Owsianik 2008).

Review of Theories and Concepts

Developmental theories and concepts will be used to frame this review of research on family engagement. The ecological theory lends itself nicely to studies on family engagement and DLLs in that it considers all systems in which children develop: from proximal (school, family) to distal (culture, neighborhoods), and their bi-directional interactions (Bronfenbrenner 2005). The theory argues that optimal learning occurs when there are harmonious interactions between systems (e.g., school and family). Culture directly and indirectly influences the systems in which children develop (Bronfenbrenner 2005; Durand 2011; Halgunseth et al. 2009; Xu and Filler

2008). When the culture of the school and the culture of the family come into contact with each other, they influence and change each other, creating a unique "developmental niche" (Super and Harkness 1986) in which DLLs develop (Harkness, Super, and Keefer 1992; Trumbull et al. 2003). Thus, the ecological theory suggests that optimal learning for DLLs occurs when there is a strong, harmonious partnership between DLL families and ECE programs, which includes the consideration and incorporation of the DLL culture and language in program planning.

However, the ecological theory does not explain how relationships, such as those between schools and families, develop. An understanding of the processes involved in relationship development is particularly important for addressing the perceived lack of involvement expressed by schools serving DLLs (Ramirez 2003). For this, we turn to the social exchange theory.

The social exchange theory explains that strong partnerships develop when there is an exchange of resources and a perception of high utility by both parties. *High utility* refers to the rewards of a behavior outweighing the costs. Rewards and costs may be either tangible or intangible (Early 1992; López, Kreider, and Caspe 2004; Nakonezny and Denton 2008). For DLL family members, rewards may include information on child development (tangible) or the feeling that their culture and language are respected (intangible). Costs may be monetary (tangible) or the feeling of frustration when trying to communicate to school staff in a less familiar or unfamiliar language (intangible). Among low-income and linguistically diverse families, research has found that greater satisfaction with various points of school contact (e.g., telephone conversations with the school, interaction with school administrators, notes sent home) and fewer perceived obstacles (e.g., language and time constraints) were associated with greater mother and father family engagement in Head Start programs (McWayne, Campos, and Owsianik 2008; McWayne, Fantuzzo, and McDermott 2004). Thus, strong partnerships develop when programs and DLL families feel that the rewards of their interactions outweigh the costs (Halgunseth et al. 2009).

The concepts of cultural, social, and human capital should also be considered in understanding the importance of strong DLL family engagement in ECE programs. *Cultural capital* refers to the cultural knowledge of customs and beliefs that family members have accumulated via experience. For example, DLL family members who did not attend school in the

United States may not be familiar with traditional strategies typically associated with family involvement, such as bake sales and PTA meetings; this disparity may lead to miscommunication and misunderstandings between schools and DLL families (Durand 2011; Lareau 1987; Lee and Bowen 2006). *Social capital* refers to the value of social networks for the advancement of children's opportunity and growth. For example, DLL family members who are disconnected from school networks may have less access to school-related information than families who are connected to networks within the school and, hence, may be unaware of learning opportunities available to their children, such as summer reading programs, after-school homework assistance programs, available pre-K programs, and other community-based programs that could bolster learning for DLLs (Coleman 1987, 1988; Durand 2011; Sheldon 2002; Suizzo et al. 2012; Weiss et al. 2009). Lastly, *human capital* refers to personal attributes, education, and competencies that help individuals advance in life. For example, the education, skills, and interests of DLL family members influence the quality of their own lives, as well as the lives of their DLL children. Thus, early childhood programs that identify and engage DLL family members' human capital or strengths in program instruction may facilitate and support the learning and development of DLL children in the program (Coleman 1987, 1988).

Review of Research

Grounded in the ecological and social exchange frameworks, a review of research on family engagement and DLLs will be discussed according to three domains: program, home, and community. In each domain, research on family-engagement practices will be reviewed, and recommendations for increasing DLL family engagement will be given. The underlying assumption is that both DLL families and programs must exchange resources in meaningful ways in order to develop a strong program–family partnership that ultimately engages families and maximizes children's learning (Halgunseth et al. 2009).

It is important to note that the focus of this paper is on preschools. Since findings on children in kindergarten to grade five are relevant to the discussion, we will include them in this review and will identify the age groups associated with each study that we present.

Engaging Families to Support Their Children's Development in the Program Setting

Past research indicates that family participation in school-based activities is associated with improved outcomes for young, ethnically and linguistically diverse children. Using the Early Childhood Longitudinal Study—Kindergarten Class of 1998–1999 (National Center for Education Statistics 2013), Lin (2003) examined family involvement at home (e.g., home literacy, cognitively stimulating home environment), at school (e.g., volunteering, scheduled conferences with teachers), and outside the home (e.g., use of community resources, extracurricular activities) in a national sample of ethnically and socioeconomically diverse families. After controlling for child gender, family socioeconomic status (SES), and family structure, Lin (2003) found school-based parental involvement to be more predictive of kindergartners' early literacy skills in reading, math, and general knowledge than the other forms of parental involvement. Although these findings cut across all ethnic groups in the study sample, they were strongest for ethnic minority and poor children than for European American and nonpoor children. Thus, the findings support the importance of strong home and school partnerships, particularly for socially and economically disadvantaged children. The author recommends that teacher education programs and teacher reflective practices focus on creating opportunities for families to participate in their children's schools.

Using data from the Early Childhood Longitudinal Study—Kindergarten Class of 1998–1999 (ECLS-K), Durand (2011) examined the associations between Latino family members' participation at school and home (i.e., overall parent involvement) and the kindergartner's literacy skills. Forms of school-based participation included how often over the course of the year parents attended or participated in scheduled conferences with teachers, open-house events, PTA meetings, advisory groups, fund-raisers, volunteer activities, and class events. After controlling for maternal education, income, child age and gender, and parents' acculturation, she found that overall parental involvement predicted children's literacy skills. Lastly, McWayne, Fantuzzo, and McDermott (2004) examined 307 ethnically and linguistically diverse kindergarten children from a large urban district in the Northeast and found that low levels of direct school contact with families were related to children's externalizing and internalizing problem behaviors in school and to hyperactive behavior at home. This finding, however, should be interpreted with caution since demographic variables were not considered. However, research

evidence also suggests that DLL families are least likely to contact schools and participate in school-based activities (Lee and Bowen 2006; McWayne, Campos, and Owsianik 2008; Wong and Hughes 2006).

Therefore, it is critical that educational programs understand the barriers to DLL school-based, family participation and implement evidence-based practices to improve engagement among these families. In this section, we will review research on family participation in school-based activities and possible reasons for low family engagement among DLL families. This research will be presented according to four themes that emerged from a review of the literature: (1) Addressing DLL Families' Bilingual and Bicultural Needs; (2) Developing Warm and Mutually Respectful Relationships; (3) Engaging in Regular Two-way Communication; and (4) Approaching DLL Families with a Strength-based Perspective.

Addressing DLL Families' Bilingual and Bicultural Needs

Research reveals that *low* school engagement among DLL families is often predicted by factors such as family members' language-proficiency, family income, education, acculturation, and cultural/social capital. In her national study of kindergartners, Durand (2011) found that the most powerful predictor of Latino family members' participation in school was a parent's level of acculturation, education, and income status. Acculturation was a composite measure that included the child's primary home language and the parent's country of origin. Thus, Spanish-speaking Latino parents with lower levels of income and education were less likely to participate in their kindergartners' school-based activities than were English-speaking Latino parents with higher levels of income and completed education. Similarly, McWayne, Campos, and Owsianik (2008) and Wong and Hughes (2006) found that families of DLL pre-kindergarteners and first-graders, respectively, were less likely to interact with school staff and teachers if the family members reported low incomes and low levels of education.

In addition, low English proficiency among DLL family members serves as a barrier to communication with educational programs (Arias and Morillo-Campbell 2008). In their sample of urban Head Start families, McWayne, Campos, and Owsianik (2008) found that a father's primary language spoken in the home predicted the levels of home–school conferencing and school-based participation. Home–school conferencing included communication behaviors with

the child's teachers, such as talking with the teacher about the child's educational experience or exchanging written notes or telephone calls with the teacher. School-based participation included activities such as volunteering in the classroom or chaperoning on field trips. Thus, fathers who primarily spoke Spanish or Polish in the home (rather than English) were least likely to report that they had contacted school teachers and had participated in school-based activities. Also, Wong and Hughes (2006) found that Spanish-speaking Hispanic parents of first-graders reported the lowest levels of communication with schools, compared with English-speaking Hispanic, Anglo-American, and African-American parents. Spanish-speaking Hispanic parents were also the least likely to report an understanding that they shared a responsibility in their children's education with teachers.

Qualitative research also supports past findings that language serves as a barrier in DLL family–school communication. For example, Ramirez (2003) found in interviews with DLL Latino families that the lack of linguistically diverse staff in the schools emerged as a major obstacle for DLL families' interaction with schools. Rous and others (2003) found that families who did not speak English proficiently reported difficulty in understanding telephone conversations with school officials, since they were not able to rely on nonverbal cues. Sohn and Wang (2006) found that Korean-born mothers, even those who spoke English well, had difficulty communicating with teachers face to face. A study by Lahman and Park (2004) may help illustrate this point. In the study, a Korean mother described the following:

> Sometimes I have a lot of questions for Miyoung's teacher, but it is hard to ask. I understand most things that she [teacher] tells me, but it is still difficult for me to speak. For the parent–teacher conference, I always ask my husband to participate. Before we go, I tell him about things that I want to ask the teacher; then he asks her during the conference. I feel sorry that I don't volunteer or participate in school. Her teacher might be thinking that Korean parents are not active. When I hear about parents' volunteering activities, I want to do it, but I say to myself, well, I can't do it because of English. (Lahman and Park 2004, 139)

Other researchers have reported that DLL families' inability to communicate with school staff was a barrier to family engagement for newly arrived immigrants, especially those with limited English skills (Chavkin and González 1995; Lee 2005; Ortiz 2004).

Furthermore, some researchers point to the role that limited cultural and social capital play in DLL families' interactions with schools. As stated earlier, *cultural capital* refers to cultural knowledge that family members have accumulated over time through experience (Lee and Bowen 2006), and *social capital* refers to the use of social networks for advancing children's growth and opportunities (Durand 2011). Lee and Bowen (2006) argue that it is important for schools to understand the effects of cultural capital on the academic success of ethnically diverse children and must enact strategies to engage parents from nondominant groups in their children's educational setting. Indeed, research suggests that ethnically diverse families are more likely to report a mismatch in values and customs with their children' schools. For example, Barbarin and others (2010) examined home–school match in child-rearing beliefs and socialization practices across ethnic and racial families of pre-kindergartners and found higher rates of home-school mismatch among Latino and African American families than among European American families.

Other researchers have found that cultural discontinuities between families and schools lower or decrease family-initiated school contact. In their study of elementary-school aged children, Lee and Bowen (2006) found that families who belonged to the dominant group (that is, European Americans; children not enrolled in free- and reduced-lunch programs; parents whose education levels closely matched the education levels of teachers) reported experiencing fewer obstacles interacting with schools in terms of language and cultural practices than their counterparts. In her ethnographic study, Delgado-Gaitan (1992) found that primarily Spanish-speaking parents' cultural knowledge about schooling in the United States greatly influenced their interactions with school teachers. The author found that DLL families of second-graders who had completed more years of education in their country of origin were more likely to contact school teachers and staff with their questions and to help their children with homework than DLL family members who had completed only a few years of education. Thus, educational levels and familiarity with the educational system had a great deal to do with parents' ability to guide their children through the school system. However, in the study, families from Mexico were more likely to have completed only a few years of education and hence struggled the most in participating in school-based activities.

Lastly, Durand (2011) found that Latino parents' social capital or the use of social networks to promote children's growth and learning was the most powerful predictor of parental participation in school-based practices. Using the ECLS-K data set, Durand examined school contact (e.g., participation in scheduled conferences with teachers and school-based events) among Latino parents of kindergarten children. Social capital was operationalized as a continuous variable that indicated the number of parents from the school that Latino parents either spoke to regularly or who they knew well enough to talk to about their children's education. Durand found that several variables predicted levels of Latino parental participation in schools, such as parental level of acculturation, maternal education, and income; however, social capital was found to be the strongest predictor of school-related parental involvement.

Language obstacles faced by DLL family members may also explain the relatively lower rates of DLL parental participation in ECE center-based child care programs during their children's toddler years. Using the Early Childhood Longitudinal Survey—Birth Cohort (ECLS-B), Espinosa et al. (N.d.) found that immigrant mothers of Hispanic and Vietnamese descent were least likely to enroll their two-year-olds in center-based child care programs. They also found that: (a) children with immigrant mothers were more likely to use home-based child-care homes than immigrant mothers of English-speaking children; and (b) staff members in home-based child care were more likely than staff members at center-based child care to speak the home language of the DLL families. Thus, it is possible that DLL family members may choose to enroll their two-year-olds in home-based child care rather than center-based child care because they are more able to communicate with home-care staff in their home language.

In conclusion, it is well documented that positive DLL family-school interactions are important for promoting DLL's growth and well-being; yet DLL families face several obstacles when interacting with schools. Obstacles include language, family income, education, acculturation levels, and cultural/social capital. Although it is difficult to change characteristics, such as family income and acculturation levels, programs can implement several practices to reduce the language, cultural, and social-networking barriers that keep DLL families from participating in their children's schools. These practices include hiring bilingual staff and translating information into the home language of DLL families (Halgunseth et al. 2009; Ramirez 2003) and helping families to recognize that their language and culture are strengths

that should be shared at home and in the program. Because of the mixed messages DLL families may receive about their home language, some DLL family members may adopt the misconception that their children should replace their home language with English. In such cases, programs should clarify to DLL families that their home language is a strength, not a deficit, and that it is an important mechanism for their children to use in building reading skills and learning new concepts (see Paper 1, Neuroscience Research, and Paper 2, Development Across Domains, for additional discussion of the cognitive, linguistic, and social benefits of bilingualism). Offering family and adult education classes on how families can advocate and support their children's educational experiences is one practice that programs may consider. Lastly, programs may provide DLL families with social networking opportunities (e.g., face-to-face or online) so that families of similar language and cultural backgrounds can share resources and information with each other. Together, these strategies work to strengthen cultural, social, and human capital so that DLL families can best guide their children's education and learning experiences.

Developing Warm and Mutually Respectful Relationships

Research finds that DLL families are more likely to participate in their children's educational programs if they are satisfied with teacher and staff contact and if they feel welcome and respected at the program. In a qualitative study, Ramirez (2003) found that "feeling unwelcome at the school" was a commonly stated reason given by immigrant Latino family members for not participating in their children's school. However, a few parents in the study mentioned an incident in which a female teacher sent personally addressed invitations to families in the classroom to attend an open house and to meet her. The time and courtesy that went into personally inviting each family was well received by the families in this study. To reciprocate the kindness, family members believed they should attend the open house and arranged for child care (despite the difficulty of obtaining it) so that they could attend. They enjoyed seeing their children's classrooms and found the teacher to be warm and kind, even though they could not speak because of the language barrier. Thus, this study supports the concept that reciprocal exchanges of respect are essential to building strong relationships with DLL families. As one immigrant Latino parent expressed, "How do they [teachers] expect us to respect them, if they don't respect us?" (Ramirez 2003, 102).

In their sample of socioeconomically and linguistically diverse preschoolers and their families, McWayne, Campos, and Owsianik (2008) found higher levels of school-based and home–school conference participation among families, who reported higher levels of satisfaction in their contact with program teachers and staff. Unfortunately, they also found that non-English speaking parents were the least likely to report satisfying relationships with their children's teachers. Others have also found that language-minority families report low satisfaction and feeling unwelcome at their children's program (Martinez, DeGarmo, and Eddy 2004; Quezada, Diaz, and Sanchez 2003), which may explain low school-participation rates (McWayne, Campos, and Owsianik 2008; Wong and Hughes 2006).

Researchers have implemented and evaluated programs that seek to improve the working relationships between DLL families and teachers. In California, De Gaetano (2007) and colleagues implemented a program for Latino parents and teachers called the Cross-Cultural Demonstration Project. The program sought to improve DLL family engagement in elementary schools by (a) emphasizing the importance of the home culture and language in their children's learning; (b) increasing the families' cultural capital (that is, knowledge of a culture's customs and beliefs) of the school setting in the United States; and (b) developing positive, collaborative relationships between parents and teachers.

One way of improving relationships between DLL families and teachers was achieved by having both parties prepare a meal together. In this activity, the power differential was absent, and the families and the teachers had to work as a team. This informal activity seemed to improve interactions between DLL families and the teachers. After having participated in the activity, the families felt more comfortable approaching the teachers, and the teachers seemed to recognize competencies in the DLL families that they had not recognized earlier.

In conclusion, mutual exchanges of respect between DLL families and schools are important for fostering positive DLL family–school partnerships. Thus, programs should strive to make programs warm and welcoming environments so that DLL families feel comfortable participating and interacting with each other at schools. To achieve this goal, programs must convey to families that their language and culture are respected and valued in the programs. Also, programs may seek to offer informal activities in which DLL family members and teachers can get to know and interact with each other on more equal terms (e.g., cooking a meal together).

In addition, programs may offer professional development workshops, such as those on culture and how culture influences social interactions, so that teachers may learn new ways to engage DLL families in the school programs. Lastly, programs may provide child care and transportation resources to DLL families in order to increase school-based participation and to relay the message that their presence in the program is valuable and welcome.

Engaging in Regular Two-way Communication

Regular two-way communication consists of DLL families and ECE programs valuing, sharing, and listening to each other's input on issues related to DLL children's well-being. Two-way communication allows programs and families to share information about the child and to collaborate on ways to help DLLs reach learning goals that have been jointly set and agreed upon by the program and the family. Regular two-way communication may be the first step toward increasing family engagement and is a key part of developing strong DLL family–program partnerships (Baker and Manfredi-Petitt 2004; Carlisle, Stanley, and Kemple 2005; Halgunseth et al. 2009; Marcon 1999).

Past research has identified several issues relating to poor communication between DLL families and programs. For example, Quiocho and Daoud (2006) interviewed DLL families from Southern California and found that the families identified a "lack of communication" as the primary reason for poor family–program partnerships. They believed that poor communication could be improved if programs were equipped with linguistically diverse staff and if they implemented ways in which DLL families could communicate more easily with programs in their language of proficiency. Also, several families voiced concern that programs did not relay important information to them, such as disciplinary-related decisions, school events, and opportunities for children.

Lahman and Park (2004) also found communication-related issues emerged from their study of Chinese and Korean families and their children's preschool teachers. They found that the first several weeks of school were particularly stressful for both parents and teachers in terms of communication. Some preschool teachers reported that they were intimidated by the prospect of not being able to communicate easily with family members with limited English abilities. Telephone conversations were particularly difficult. For example, teachers reported incidents in

which they had to call DLL families multiple times because family members would hang up on them because of the language barrier. When Asian children's names are spelled alphabetically, they usually do not reveal the gender of the child. One teacher, after a lengthy interview with family members who spoke little English, reported frustration at not being able to ascertain the gender of the family's child. Apparently, the family members would refer to their child sometimes as "he" and sometimes as "she" during the same interview. Lastly, many family members who had difficulty communicating in English felt hesitant about participating in their child's program because they feared that they would not be helpful to the teacher because of insufficient English skills and knowledge of U.S. culture.

Because of these issues, the literature has recommended several strategies for improving two-way communication between programs and DLL families. First, it has been suggested that programs develop a language and communication policy and share it with DLL families and program staff (Halgunseth et al. 2009). The policy should specify the methods that DLL families can use to communicate in their home language (e.g., e-mail addresses, the names of bilingual staff members who speak the home language, the time frame during which they can call teachers, and the location of comment boxes). Additionally, Quiocho and Daoud (2006) recommended that programs support DLL family communication by offering bilingual newsletters and options to schedule monthly meetings at local community centers.

Eberly, Joshi, and Konzal (2007) also offer several strategies for improving communication, based on a focus-group study they conducted with 21 preschool and elementary school teachers in which they asked them to share strategies they felt were effective for communicating with DLL families. First, participants recommended that teachers shape communication in the form of questions rather than tell things to families. Second, they recommended that teachers be sincere and honest when speaking with families and be careful not to "talk down" to DLL families. Third, they encouraged teachers to research the DLL families' culture and language. For example, one teacher told the story of when she was anticipating the arrival of a new student from an island who spoke French and Portuguese. The teacher acknowledged that she did not know anything about that island but decided to read books, ask other people in her church about the culture, and learn high-utility phrases in the DLL's home language that would be helpful to the child, such as, "Do you need to go to the bathroom?" Fourth, teachers recommended meeting with DLL families in their homes rather than calling them when a conference was necessary.

Fifth, participants suggested that teachers start conversations with families with positive news about their children and then communicate about more challenging issues, if needed.

Lastly, professional development workshops have been documented to improve two-way communication with DLL families. In their qualitative study, Trumbull, Rothstein-Fisch, and Hernandez (2003) found that DLL family engagement improved when teachers engaged in self-reflection on the importance of culture and its influence on behavior and developed culturally sensitive strategies to increase two-way communication with DLL families. New strategies included offering DLL families the option to attend family–teacher conferences as a *group* with other DLL families. In keeping with collectivistic orientation, one teacher found that families felt more comfortable expressing their concerns and communicating their ideas collectively, as a group, than individually, in a one-on-one meeting with the teacher. Another teacher changed the communication style with families so that it reflected a more collectivistic orientation. That is, instead of waiting for DLL families to help and becoming frustrated when they did not, the teacher asked them to help and was surprised at how well they responded to the personal requests. Other teachers offered to delay the family–teacher conferences an hour later to accommodate family members' work schedules or to meet families in schools that were closer to the communities in which they lived. At the end of the self-reflection program, teachers reported stronger, mutually beneficial relationships with DLL families; and a personal appreciation of cultures and how they influence social interactions.

Two-way communication between programs and DLL families is especially important when it comes to decision making and goal setting for children. Barbarin and others (2010) found that preschoolers achieved greater skills when parents and teachers shared similar child-centered beliefs and practices. Thus, it is important that programs ask DLL families to collaborate and participate in goal setting for their children and come up with contexts and strategies in which their children learn best (De Gaetano 2007).

In conclusion, two-way communication allows DLL families and programs to exchange information on DLLs' learning progress and well-being, as well as collaborate on goal setting for DLLs. Information exchange and goal setting have been found to improve family-program partnerships and to promote positive child outcomes. Two-way communication can occur during one-on-one meetings with the teacher, in a more informal setting, such as in the DLL families'

homes, in their communities, or in a group setting with other DLL families of similar linguistic backgrounds. Also, it may be important for programs to develop a language and communication policy that informs staff and families on the programs' value of two-way communication and the modes in which DLL families and programs can communicate with each other. Lastly, professional development on communication techniques (e.g., asking questions) and on cultural styles of communication may facilitate positive two-way communication among DLL families and programs.

Approaching DLL Families with a Strength-based Perspective

Although cultural and linguistic discontinuities may pose obstacles, families' diverse knowledge and skills may also serve as resources for teachers and programs. These skills or resources are also referred to as *funds of knowledge*. According to González, Moll, and Amanti (2005), *funds of knowledge* are resources that families possess that promote children's social and academic competence. Funds of knowledge are sometimes viewed as implicit because they are conveyed indirectly within the family, as a part of living together, rather than through the intentional didactic methods employed by schools. For DLL families, funds of knowledge include their knowledge of diverse languages, cultural values, and interests.

The research literature documents several funds of knowledge (that is, resources or strengths) that DLL families bring to their children's preschool programs. First and foremost, DLL families bring their languages and cultures. Learning new languages and cultures raises global awareness across the program, and research finds that such learning has considerable cognitive benefits for children (Bialystok 2009; for further discussion of the cognitive, linguistic, and social benefits of bilingualism see Paper 1, Neuroscience Research, and Paper 2, Development Across Domains). Thus, teachers should see families as a resource for teaching new languages and cultural traditions and should encourage families to continue supporting the development of the home language at home, as well as think about ways to involve parents to participate in the preschool class and share their home languages and cultures.

Second, an emerging body of research finds that young DLL children demonstrate stronger socio-emotional skills and greater behavioral control at school entry than do monolingual children do (Crosnoe 2012; De Feyter and Winsler 2009; Galindo and Fuller 2010; Han 2010;

Han and Huang 2010; Luchtel and et al. 2010); hence, programs may inquire into strategies that DLL families use to promote positive socio-emotional and behavioral development in children and incorporate them in the classroom. Third, it has been found that DLL Latino families take their children's moral education (that is, *la educación*) and behavior seriously (Goldenberg and Gallimore 1995); therefore, teachers may explore the unique ways in which Latino families educate (that is, *educa*) children and approach moral education at home (Delgado-Gaitan 1992). Fourth, researchers documented that immigrant Latino mothers often emphasize *cariño* (affection), not harshness, in their teaching styles with young children (Livas-Dlott et al. 2010) and that they emphasize affectionate parent–child relationships (Hammer, Miccio and Wagstaff 2003). Thus, programs may also be able to ask for guidance in developing warm and trusting relationships with young DLL children. Lastly, it is documented that DLL families are nearly twice as likely to live with extended family members and in multigenerational households (Hernandez, Denton, and McCartney 2008). These additional family members are potential resources that are at times overlooked in traditional parent-involvement models. Extended family members can contribute to the teacher's knowledge about the DLL or can help reinforce concepts at home that were learned in school with the DLL. They also can share their vast interests and skills with the preschool program.

When viewed as assets, funds of knowledge, such as those reviewed above, can support learning in preschools and can be integrated into the preschool curriculum. Thus, teachers and programs may seek to identify, incorporate, and support funds of knowledge of DLL families so that the entire program may benefit from the skills and knowledge (Arias and Morillo-Campbell 2008; De Gaetano 2007). Unfortunately, however, it appears as though the research on the advantages of dual language development and the importance it has on children's development (see Paper 1, Neuroscience Research, and Paper 2, Development Across Domains, for further discussion of the cognitive, linguistic, and social benefits of bilingualism) has not reached many DLL families. In a qualitative study on Korean American families, Kim (2011) found that the parents' lack of knowledge about American culture and their lack of fluency in English made them believe that they should minimize their influence on their children's education. These beliefs, in turn, prevented DLL parents from playing an active role in sharing their home language and cultural knowledge. Consequently, it is critical that programs approach DLL families with a strength-based framework. Such an approach will help DLL families

appreciate how valuable their language and culture is and how it supports their children's development and school readiness (Winsler et al. N.d.).

There are other ways in which teachers can help DLL families recognize the strengths that they bring to their children's education. Useful strategies include identifying family members' interests and skills and then finding ways to engage those interests at the program (De Gaetano 2007; Valdés 2001). Interests and skills will vary across DLL families. Thus, it is important for programs to be open to and offer a wide range of opportunities for DLL families to participate in the programs. For example, De Gaetano (2007) provided a workshop to elementary school teachers on new strategies that they could use to increase family engagement with DLL families. Teachers tried new strategies in their schools and found that DLL families were willing to participate in a wide range of activities. Some DLL family members preferred to lead new activities in the classroom, such as teaching students how to build a kite. Other DLL family members felt more comfortable participating in day-to-day activities, such as handing out and collecting papers. The key is that teachers learned to offer a wide range of activities and to find ways of engaging DLL family members' diverse interests and skills. In turn, all students in the program benefited from DLL family participation (De Gaetano 2007; Trumbull, Rothstein-Fisch, and Hernandez 2003).

Adult workshops may also support DLL families' understanding of how their culture, language, and individual interests and skills can support their children's learning. For example, *Abriendo Puertas* is a program that, through a series of 10 sessions, helps DLL families identify ways in which they can be an advocate and support their children's education. After participating in *Abriendo Puertas,* DLL families reported greater confidence in being advocates for children in schools and in other parenting skills, such as reading to their children at home in Spanish and preparing their children for school (Bridges, Cohen, and Fuller 2012).

Lastly, it is important for all families, including DLL families, to feel that their opinions and input about their children's education are valued. DLL families may choose to be an advocate for their children at the program level by participating on family advisory boards, or they may contribute at the classroom level by working with teachers to set learning goals for their children or by suggesting teaching strategies in the classroom that they believe will benefit their children. Since families are the first and foremost primary teachers of their children, both in the home

setting and outside of the preschool experience, programs may benefit from inviting DLL families to share their ideas on how programs can support DLL families and DLL development and to also participate in more formal ways such as participating on planning boards (Cochran 2007; Flaugher 2006; Moore 1998; Muscott et al. 2008).

In conclusion, it is critical that DLL families recognize and be recognized for their strengths and contributions to their children's learning and development. These strengths include language, culture, and personal interests and skills. Therefore, programs may seek to emphasize a strength-based framework by developing a mission statement that expresses the program's appreciation for cultural and linguistic diversity and sharing the statement with both staff and families. In sum, DLL families should be encouraged to make known to their children's programs their strengths and be asked to participate in joint goal setting for and decision making about their children's education. The entire program benefits when educators incorporate diverse cultures, languages, and talents of DLL families into the programs' learning environment and curriculum.

Engaging Families to Support Their Children's Development at Home

Bronfenbrenner's ecological theory suggests that harmonious interactions between homes and schools are essential for positive DLL development (Bronfenbrenner 2005). Thus, it is critical that knowledge from DLL home environments be incorporated into program curriculum planning and that concepts and skills learned in the program be reinforced at home and in the community (Downer and Myers 2010). Home environments, for example, are a critical venue in which DLLs can learn, practice, and reinforce concepts, such as literacy building skills, in their home language that were initially introduced in school.

Research found that exposure to the heritage language at home serves as a protective factor for children of immigrants and their cognitive development. According to a national study of DLL preschoolers, Winsler and others (N.d.) found that the use of families' home language was a protective factor for children of immigrant families. After controlling for country of origin and family demographics, such as income and education, Winsler and others (N.d.) found more positive cognitive outcomes for children of immigrant families when some amount of their home language was being spoken in the home, compared families who spoke only English. Thus, it is

important for preschool programs to encourage learning at home in DLLs' home languages. This may be particularly beneficial in the realm of reading and literacy-building skills.

Engage Families Around Literacy Building

Numerous studies have found that reading and literacy-building activities in the home is critical for DLL development (Goldenberg, Rueda, and August 2006; Perry, Kay, and Brown 2008; Melzi, Schick, and Kennedy 2011). Using a national data set of Latino kindergartners, Durand (2011) examined the relation between parental involvement in the home and Latino children's literacy skills in kindergarten. Parental involvement at home included nine items that assessed how often families engaged their children at home in a variety of school-readiness activities, such as reading, telling stories, singing songs, and doing chores. Durand (2011) found that parental involvement predicted higher literacy skills for Latino children. However, the author also found that Latino parents were less likely to participate in school-readiness activities in the home when the following conditions existed: (a) the primary language of the family was not English; (b) mothers had completed relatively few years of education; and (c) the parents had only a small social network at school to ask education-related questions.

Although the focus of this paper is on preschools, research on DLL infants and toddlers may also apply and hence are included in our review of the research literature. For example, in their national study of nine-month-old infants, López, Barrueco, and Miles (2006) found similar results regarding home-literacy building skills as Durand (2011). Like Durand (2011), López, Barrueco, and Miles (2006) found that Latino families were less likely to read books and tell stories to their young children in the home, compared with other ethnic groups. This finding is in light of research that suggests reading at home and other literacy-building activities are critical to children's cognitive and academic development in school. One possible explanation of this finding offered by López, Barrueco, and Miles (2006) is that DLL families may be receiving mixed messages from outside sources, such as other family members, friends, and the media, regarding the importance of reading in a language other than English. Some of these sources may not encourage reading in the home language or may place such a high priority on reading in English at home that DLL families feel discouraged to read to their children in the home language.

In addition, the types of literacy-building activities may differ depending on immigration status and culture. For example, James and Martin (2009) compared the home-literacy activities of 17 Russian immigrant families and 23 nonimmigrant families in a rural area of Missouri. They found that nonimmigrant parents more frequently pointed out print and words in children's environments and used songs and rhymes. In contrast, the Russian immigrant parents brought their children more frequently to libraries. No differences existed between the two groups on the frequency with which they read to their children or their interactions during reading (e.g., whether they allowed child to turn pages, asked questions about the books, or helped children learn new words in the books). Moreover, while some families promote literacy-skill building through reading books, other families use less traditional outlets. In an ethnographic study of 12 four-year-old and five-year-old Mexican immigrant children living in the Southwest United States, Reyes and Azuara (2008) found that children were developing knowledge and metalinguistic awareness about print in both Spanish and English by participating in daily literacy routines with family members, such as writing and reading general notes, cards, letters, and religious texts. Furthermore, research finds that within a culture there is variation in the value that families place on reading with their children. For example, families from Beijing believe reading is an important vehicle in which to relay moral and social lessons to their children, while families from Hong Kong perceive reading as an entertainment opportunity for children and families to share (Li and Rao 2000). Families who value reading, regardless of how they define their values, are more likely to read and obtain books for their children (Wu and Honig 2010).

The literature suggests several key strategies for promoting literacy in DLL homes. For example, joint reading is a highly valued practiced among experts of family language and literacy practices. It not only enhances vocabulary and listening comprehension (Sénéchal and LeFevre 2002), but more importantly, it can engender love of language and of books and motivation to read. Continued exposure to books reinforces the link between spoken words and print for children (Rush 1999). Opportunities to interact with print and to become familiar with the conventions observed in printed material are important to emergent literacy skills. Not surprisingly, book exposure is predictive of language competence, such as receptive vocabulary, listening comprehension, and phonological awareness (Sénéchal and LeFevre 2002). Frequent

and extensive exposure to books provides more practice and thus affords DLL children greater opportunities to acquire emergent reading skills.

Intergenerational learning is a form of joint reading that has been well supported in the literature. In their sample of Mexican immigrant families, Reyes and Azuara (2008) found several instances of intergenerational learning. For example, they found that adults and older peers seemed to help advance younger children's literacy skills. While reading, DLL children would switch between expert and novice roles such that there were instances during reading when DLL children would translate an English word into Spanish for their parents. In addition, the authors noted that children developed literacy-related skills, such as metalinguistic awareness, about print in both languages during day-to-day activities with family members, such as reading letters, cards, notes, or religious texts. The authors concluded that children transform and build on meaning in literacy-related events while interacting with peers and family members in the home environment.

Thus, it is critical that both programs and DLL families understand the developmental importance of teaching concepts (e.g., those relating to literacy) to young DLLs at home and in the home language. To promote literacy among DLLs, teachers may encourage DLL families to select books; make their own books in their home language (Bernhard et al. 2006; De Gaetano 2007), or engage in joint- or intergenerational reading. If there are shortages of books in certain languages, programs may encourage DLL families to purchase books in their home country; ask visiting family and friends from their home countries to bring children's books; and utilize online book ordering services that specialize in international children's books. Furthermore, programs may encourage DLL families to implement other literacy-building activities in the home, such as singing nursery rhymes (Espinosa 2008) and narrating stories in their home language about activities that occurred during the day (Melzi, Schick, and Kennedy 2011). Lastly, ECE programs may identify books in the home language of families to borrow from the library, or they may consider offering an on-site multilingual library resource room in the program that lends materials to DLL families and that provides a venue for them to share with and lend materials to each other (Castro 2011).

Engage Dual Language Families in Children's Oral Language Development

Since the family is a child's first and primary teacher, it follows that DLL families have an influential role in the development of their DLL children's oral language skills. If these opportunities are fully exploited they can have a pervasive, subtle, and potentially profound influence on the sophistication of DLL children's understanding and use of language, including the range of their vocabularies. Verbally sharing experiences, explaining events, and discussing opinions expand receptive vocabulary and discourse skills that are pivotal to skilled reading (Beals, DeTemple, and Dickinson 1994). Thus, it is important that programs encourage DLL families to speak in the language in which they have the greatest fluency and largest vocabulary.

DLL families can promote their children's language development through everyday conversations and verbal exchanges with them. Responses to children's queries and efforts to explain events and elaborate verbally on children's experiences expand children's vocabulary and language skills. Opportunities for stimulation of children's language development are ubiquitous and natural within the mundane activities and routines that make up family life (Whitehurst and Lonigan 1998). They occur, for example, during mealtimes when parents and children recount the day's events, while traveling from one place to the next, or during baths or at bedtimes. These language-stimulating interactions also occur during reading, storytelling, and singing with children. Reading to and encouraging DLL children to ask and answer questions during reading and writing activities, guided television watching (Marvin and Mirenda 1993), and mealtime conversations (Jordan, Snow, and Porche 2000) have emerged as particularly influential in language and reading development. These family activities or practices deepen DLL children's understanding of the meaning of words, ideas, narratives, and the world around them (Beals, DeTemple, and Dickinson 1994; Jordan, Snow, and Porche 2000; Rush 1999).

Oral language opportunities at home should occur in the language that families use easily and naturally. However, research finds that the amount of oral-language opportunities in the home may vary among families and among cultures depending on parenting beliefs and priorities. For example, caretakers may vary in the amount time they engage their children in joint attention, child-directed speech, and in conversational turn taking. Maternal responsiveness and mother–child mutual engagement in activities are also correlated with children's vocabulary size (e.g., Tamis-Lemonda et al. 1998). Lastly, these properties tend to vary as a function of maternal

education and contribute to the SES-related differences in children's vocabulary (e.g., Hoff 2003).

In sum, programs and DLL families are influential in children's oral language development, since the sheer amount of speech children hear and the richness of the speech input (e.g., use of a variety of words) facilitate vocabulary development (e.g., Hoff and Naigles 2002). Thus, it is critical that programs convey to DLL families the importance of speaking to their children in the language in which they are most proficient, and suggest that DLL families seize as many opportunities as possible to engage their children in extended and enriched conversations (see also Paper 3 for further discussion of program elements and teacher practices to support young DLLs).

Connect with Dual Language Families Through Home Visits

Home visits are a powerful strategy for connecting schools and homes and for reinforcing academic and developmental concepts that are presented in school in the home environment (Bouffard and Weiss 2008; Delgado-Gaitan 2004; Ginsberg 2007; Halgunseth et al. 2009; Logan and Feiler 2006; Sanders 2008; National Center for Research on Cultural Diversity and Second Language Learning 1994). However, research found that certain aspects of home visits predict young children's cognitive and language development better than others.

For example, Raikes and others (2006) examined the associations among home visits, children's cognitive and language development, and home-literacy practices in a sample of low-income, ethnically and linguistically diverse families participating in Early Head Start. They found that the duration of home visits predicted improvement in the families' home languages and literacy practices when children reached the age of 36 months. However, the proportion of time that home visitors dedicated to child-focused activities was the strongest predictor of children's cognitive and language development scores and parental supportive practices for children's language and learning. Thus, it is important to devote a sufficient amount of time to child-focused activities during home visits.

In conclusion, preschool programs and curricula must evolve and reflect the families they serve. One way of achieving this is by learning about the home environments of students and incorporating this new information into program planning. Programs may gather this information during enrollment periods or during formal or informal meetings with the children's families. In

addition, programs may encourage DLL families to read to their children in the home language and may suggest bilingual books for them to read to their children. Also, high-quality home visitors may help guide DLL families in applying new concepts learned in school at home. Home visitors and teachers should encourage DLL families to read to their children in their home languages or to participate in other literacy-building activities in their home languages, such as singing nursery rhymes and narrating stories.

Utilizing Community Resources to Support Family Engagement

The research literature on family engagement emphasizes that children's learning can occur across a range of settings and that programs and families should consider incorporating the community into children's learning experiences (Weiss et al. 2009). In particular, the communities in which DLL families live may provide unique resources to the preschool curriculum and may enhance learning for all children in the program. Moreover, communities may provide rich environments in which DLL families and teachers apply concepts learned in preschool or at home. Lastly, family liaisons may serve as an important community resource that can facilitate communication between DLL families and preschools, and promote positive family–school partnerships on behalf of DLLs.

Connect Families to Learning in the Community

The literature emphasizes the importance of including the community in the concept of family engagement (Weiss 2008; Sanders 2008). The community may serve as a rich resource of role models and history from which children can learn. Schools and families can draw additional ideas to incorporate into the curriculum. Since families often live in the communities where their children's schools are located, they may be more familiar with the history of the area and may be able to recommend learning resources or recreational areas for their children's programs to incorporate into the preschool curriculum. Lastly, preschool classes may coordinate field trips to DLL families' places of employment in the community that connect to lessons taught in the classroom. For example, if a DLL family member works at a bakery or a recycling facility, then classroom lessons may include making bread and recycling and DLL learning may be supported by visiting the family members' places of employment. Thus, programs can make connections in communities in ways that engage DLL families and support learning for DLL children.

Utilize Family Liaisons

In her qualitative research, Sanders (2008) proposes that parent liaisons, that is, individuals who bridge communication between schools and families, are important links that strengthen home–school communication and partnerships. The author examined an ethnically diverse suburban district and the roles of parent liaisons in approximately 70 elementary, middle, and high schools. Using observations, document data, and surveys, the author found that parent liaisons serve four critical home–school partnership functions. First, liaisons provide direct services to families at risk. Second, they support teacher outreach. Third, they support school-based partnership teams. Fourth, they collect data for improving school partnerships. Although the study was conducted with schools serving children in kindergarten to grade twelve, each of the parent-liaison functions detailed above (for example, providing direct services to families, supporting teacher outreach) could also apply to early childhood settings. Bilingual and bicultural family liaisons, in particular, could serve as an important resource for enhancing communication between DLL families and early childhood programs and thus maximize learning for young DLLs.

In conclusion, the community may also provide resources that programs and DLL families can incorporate into their day-to-day teaching of young DLLs. These resources include historic areas in communities and neighborhoods or public library collections of bilingual reading materials. Parent liaisons may also serve as an important community resource and link that can bridge DLL families and schools and facilitate learning across home and school contexts.

Promising Practices

In this section, we present several promising practices and programs for engaging DLL families. Each program or practice for improving DLL family–school partnerships has been supported in the research literature. The programs are presented according to the following categories: (1) Family or Adult Education; (2) DLL Literacy Building; (3) Professional Development; and (4) Social Capital/Social Network Building.

Family or Adult Education

Abriendo Puertas*/*Opening Doors. Culturally sensitive family and adult education programs that are either school- or community-based are found to be effective tools for increasing cultural capital among DLL families. *Abriendo Puertas*/*Opening Doors* (Bridges, Cohen, and Fuller 2012) is a 10-session, school-based parenting and advocacy program for DLL Latino family members. The program was developed by and for low-income Latino family members who have children ages zero to five years old, and it teaches parenting skills and ways in which DLL families can be effective advocates for their children's education. Evaluation research that uses pre-and post-measures finds that DLL families who participated in *Abriendo Puertas*/*Opening Doors* demonstrate significant increases in their knowledge of children's language and literacy development, social–emotional development, health development, and school preparation. DLL family members also exhibited gains in understanding their rights as parents in schools and their children's rights in school. Lastly, family members who participated in *Abriendo Puertas*/*Opening Doors* reported an increase in self-confidence regarding their parenting skills, especially in areas such as preparing their children for school and acting as advocates on behalf of their children in schools. *Abriendo Puertas*/*Opening Doors* has been implemented in California and 30 other states, and includes a Training-of-Trainers Institute, in which community educators, trainers, and other leaders can implement the 10-session program in their communities.

Cross Cultural Demonstration Project. De Gaetano (2007) found evidence supporting the efficacy of the Cross Cultural Demonstration Project, a federally funded family-involvement program that sought to improve educational outcomes for DLLs in California by increasing the cultural capital and the participation at school among DLL families. According to the author, culturally sensitive, school-based family education classes improved DLL Latino family participation in two elementary schools in California. The program focused on elementary school participation, but the findings are applicable to preschool settings.

In the Cross Cultural Demonstration Project, participating DLL families learned about their children's typical day in the classroom, typical program schedule, and the important role parents have in the education of their children. DLL families learned that they are their children's primary teachers and that "teachers" are found not only in schools. Workshops focused on the

importance of two languages and offered activities, such as storytelling, that families could use to enhance their children's literacy skills. Lastly, the program helped DLL families to brainstorm and to role-play activities that they could implement in their children's classrooms, such as making kites, knitting, and so forth. De Gaetano (2007) found that some families (those with fewer years of completed education) preferred to participate in other ways, such as distributing or collecting papers in the classroom. DLL families revealed that participating in the classroom helped them transfer ideas and activities to the home. They reported that their interactions with teachers helped them feel respected in the classroom. De Gaetano (2007) found that when DLL families participated in the Cross Cultural Demonstration Project, it resulted in an increase (15 to 45 percent) in DLL family participation in the school.

Parent Institute for Quality Education (PIQE). PIQE is a community-based, nine-week parent education program. To accommodate families of DLL children, classes are taught in 16 languages. Parents learn a variety of skills to promote their children's learning and development. For example, parents learn how to establish and maintain supportive home–learning environments; communicate with their children's educational programs; utilize school resources; and support their children's social and emotional development. Studies demonstrated PIQE's effectiveness in promoting parental participation in educational programs (Ochoa and Mardirosian 1996) and its link to long-term academic success, such as high school graduation rates (Vidano and Sahafi 2004). The strategies shared with parents would be generally applicable to a preschool setting.

DLL Literacy Building

Early Authors Program. Evidence from the Early Authors Program—in which DLL preschool children, their parents, and their teachers worked together to create books ("identity texts") in which the children themselves were the protagonists—demonstrates significant gains in children's language and cognition scores (Bernhard et al. 2006). The authors hypothesize that these gains were a result of cognitive engagement and the development of an affective bond to literacy. The authors further point out that although many of the more than 1,000 students in the study had the potential to experience serious learning difficulties in their schooling (as do more than half of the total number of low-SES children of color in the United States), this intervention

seemed to reduce some of the initial achievement gap that is associated with those learning difficulties (Bernhard et al. 2006).

Literacy for Life. Literacy for Life was designed by Canadian researchers (Anderson et al. 2010) for low-literate adults and their three-year-old to five-year-old children. The program was an intergenerational literacy program that incorporated authentic literacy activity with the goal of raising low English-literacy levels of the parents and the English emergent literacy levels of their non-English speaking young children. In Year One, the program was offered for two hours per day, two days per week, for four months. In Year Two, it was offered for seven months, with the same frequency and length of time. Each session had three components: adult literacy, early childhood literacy, and family-together time. The program was based on a model that focused on authentic literacy instruction. At Site One, the participants consisted of 16 recent Chinese immigrants with limited proficiency in English. At Site Two, there were six refugee families from Africa and 12 families from the Middle East. To determine growth in adult literacy, researchers obtained pre- and post-test scores on the Vocabulary, Reading Comprehension, and Spelling Subtests of the widely used Canadian Adult Achievement Tests (CAAT), using the norming group as a control. To determine growth in children's literacy, researchers compared children's pre- and post-test scores on the Test of Early Reading Ability III. The results indicate that both parents and children showed statistically significant growth in their English literacy and emergent literacy abilities when compared with the norming groups.

The Intergenerational Literacy Project (ILP). ILP in Chelsea, Massachusetts, is a family literacy program that seeks to integrate parents' resources to promote children's learning and literacy development in the home. Participants from different ethnic backgrounds attended classes that supported parent-literacy development, as well as family literacy in the home. Parents who participated in ILP increased their use of reading and writing outside of the school setting and their engagement with their children in literacy activities (Paratore 2005).

***Proyecto de Literatura Infantil* (Children's Literature Project).** In California, *Proyecto de Literatura Infantil* targets Spanish-speaking families and capitalizes on the language resources of Latino families. To promote literacy, parents meet to listen to and discuss children's literature. Activities offered by this program also promote literacy development at home. Participants of the program became more familiar with what their children were learning; became more confident in

their own reading and writing abilities; and created networks with other parents who participated in this program (Ada and Zubizarreta 2001, 229–44).

Professional Development

The Bridging Cultures Project. The Bridging Cultures Project was a six-year longitudinal collaborative research project for teachers who worked with DLL families. The project sought to increase teachers' understanding of culture and to improve their interactions with DLL families by implementing workshops in seven elementary schools in Los Angeles, California. In a study conducted by Trumbull, Rothstein-Fisch, and Hernandez (2003), seven teachers, one from each elementary school, participated in the six-year longitudinal collaborative action research project. The professional development program consisted of three phases. The first phase promoted teacher understanding of individualistic and collectivistic orientations, and identified how practices in schools stem largely from an individualistic orientation. The second phase encouraged teachers to explore new strategies with DLL families that reflect a collectivistic orientation. The third phase of the project required the teachers in the project to extend their knowledge on individualistic and collectivistic orientations by teaching and encouraging other teachers in schools to explore new strategies with DLL families from a collectivistic orientation.

At the end of the six-year program, the original seven participating teachers expressed that they had a greater appreciation of how culture influences interactions, and they discovered several new and effective strategies to use with DLL families. One teacher started to offer DLL families the option to attend parent–teacher conferences, as a group, with other DLL families rather than attend one-on-one meetings. Another teacher found that DLL families appreciated the concept of teamwork and reciprocal exchanges of help. As such, when asking DLL family members for help, teachers received a positive response. Other teachers found that meeting families in their community settings increased families' interaction and attendance at parent–teacher conferences.

Social Capital/Networking Building

The importance of expanding social networking opportunities (that is, social capital) for DLL families has been raised by some researchers (Durand 2011). Delgado-Gaitan (1992) found in her ethnographic study that immigrant Latino families often sought information about

education-related issues from churches or other Spanish-speaking parents in church. For example, one immigrant single father knew his child was reaching the age to start kindergarten, but he did not know the school where he should enroll his child; the enrollment dates; how to register his child for school-bus transportation; where the bus would pick up his child; and so forth. He approached a family at church and asked these questions, because he knew that the family had elementary-school-aged children and that the family members spoke Spanish. Unfortunately, the father could not draw upon his own experiences, because he had never attended school in the United States and had completed only a few years of education in his home country.

In addition, Delgado-Gaitan (1992) found that other parents relied on available social networks for help. The author describes the story of an immigrant mother who had limited experience with the school system in the United States. The mother received notes from a teacher at her child's school stating that the child was misbehaving and not performing well. Each time she received a note, the mother punished her child, but the notes continued, and the situation with the child at school grew worse. The mother did not know what to do, so she turned to a friend at work who was of a similar culture but who had more cultural capital (that is, knowledge of cultural customs and beliefs). The friend suggested that the mother make an appointment with the teacher and request the day off from work to attend the meeting. The mother did this and was very grateful for the advice. At the meeting, the child divulged to his mother and his teacher that he was being teased by certain students, which thus provoked his behavior in the classroom. After the meeting, the situation was resolved and the child's behavior improved. The mother, who had felt at a loss at what to do, now felt as if she knew the proper procedure for helping her child.

Immigrant DLL families often face the problem of a lack of a social network or social capital in which information about their children's education can be circulated. As such, researchers called for an end to the isolation of immigrant DLL families (Arias and Morillo-Campbell 2008; De Gaetano 2007; Ramirez 2003). In her study, Durand (2011) found evidence that communication with other DLL families may be helpful in increasing involvement at school among Latino DLL families. Thus, researchers recommended helping DLL families build social capital and extend their social networks at school via discussion groups or online discussion

forums in which families with similar language and cultural backgrounds can share information with each other (Arias and Morillo-Campbell 2008; Delgado-Gaitan 1992; Durand 2011).

In conclusion, promising practices for preschool programs that serve DLLs may include professional development opportunities for teachers, such as workshops that emphasize how culture influences social interactions and how teachers can improve interactions as a result of this understanding. It may also include family- or adult-education courses for DLL families that are delivered in the families' language of preference and that seek to strengthen cultural capital in DLL families by teaching them strategies for supporting their children's academic success in the United States. Lastly, programs may seek to expand DLL families' social capital. A useful strategy for building both social and cultural capital may include developing social-networking opportunities for DLL families, such as online discussion forums. Within these networks, DLL families can share information and resources on their children's education with other families from similar language and cultural backgrounds.

Recommendations for Supporting Children's Development in the Program Setting

Address DLL Families' Bilingual/Bicultural Needs

- Hire bilingual staff (e.g., office administration, teachers, and parent liaisons) to interpret and translate school information for DLL families.
- Offer bilingual or multilingual newsletters and multilingual telephone lines to DLL families.
- Schedule regular meetings with DLL family members in their community in locations that are convenient to their work or home settings.
- Provide social-networking opportunities (e.g., in-person and online, such as a Facebook page) for families of similar linguistic backgrounds to share education-related knowledge, information, and resources.

Develop Warm and Mutually Respectful Relationships with DLL Families

- Strive to make programs warm and welcoming environments in which DLL families feel comfortable participating and interacting with each other.

- Offer staff professional development workshops, such as those on culture and how culture influences social interactions.
- Provide opportunities for DLL families and staff to informally interact (e.g., cook a meal together). The key is that these interactions are ones in which the power is more equally distributed between teachers and DLL family members.
- Provide DLL families in need with child care and transportation resources to attend school events.

Engage in Regular, Two-way Communication

- Develop a language and communication policy that informs DLL families about the modes in which they can communicate with staff (e.g., providing e-mail addresses, names of bilingual staff, telephoning hours, comment boxes).
- Develop a system of ongoing two-way communication in which families and teachers exchange information about their children's academic progress and well-being.
- Collaborate with DLL families on setting developmental-related goals for their children.
- Offer DLL families various formats in which to meet and discuss their children's progress. This format may include traditional one-on-one meetings or they may include group meetings with other DLL families of similar linguistic and cultural backgrounds. Also, programs may offer to meet families in their community at locations that are convenient to their work or homes.

Approach DLL Families with a Strength-Based Framework

- Approach DLL families' linguistic and cultural differences from a strength-based perspective.
- Develop a mission statement that expresses the programs' appreciation of cultural and linguistic diversity and share the statement with staff and DLL families.
- Incorporate DLLs' home languages, cultures, and interests in program planning.

- Invite DLL families to make known their knowledge and interests to the program staff.
- Invite DLL families to participate on their children's program boards and share their ideas on how to support DLL families.
- Invite DLL families to participate in joint goal setting and decision making about their children's education.

Engaging Families to Support Their Children's Development at Home

- Emphasize to DLL families that they are their children's first and primary teachers and that collaboration is critical for supporting their DLL children's development.
- Encourage DLL families to allow their children to learn at home in their home language, especially in the realm of reading and literacy-building skills.
- Provide DLL families with the necessary resources to teach their children new concepts at home in the DLLs' first language.
- Modify planning and curricula to represent the DLL families served in the program.
- Learn about the home environments of DLL families.
- Incorporate information learned from DLL home environments into program planning.
- Help DLL families apply concepts learned in school to their home environments.
- Encourage DLL families to teach concepts to their children in their home language first. Once their children learn the concepts in their home language, they can translate that knowledge into English.
- Encourage DLL families to read to their children in their home language and suggest bilingual books for them to read to their children.
- Conduct high-quality home visitors to help guide families in literacy-building activities such as singing nursery rhymes or narrating stories in the home language.

Utilizing Community Resources to Support Family Engagement

- Include the communities of DLLs in curriculum planning.
- Apply concepts from the DLLs' communities that have been introduced at school and at home to DLLs.
- Recruit community role models to volunteer in the classroom.
- Utilize parent liaisons as one way building a bridge of communication and understanding between DLL families and schools.

Conclusion

In California, half of all preschool-age children are DLLs, the majority of whom come from low-income households (Cannon, Jacknowitz, and Karoly 2012; Fortuny, Hernandez, and Chaudry 2010). Ecological theory, social exchange theory, and a large research base suggest that DLL children develop best when their ECE programs, families, and communities engage in collaborative relationships on their behalf. This paper presents several suggestions on how ECE programs may strengthen the DLL family–ECE program relationships in the (a) ECE program setting, (b) family setting, and (c) community setting. Strong DLL family–ECE program partnerships are crafted when programs address DLL families' bilingual and bicultural needs; develop warm and mutually respectful relationships with DLL families; engage in regular two-way communication with DLL families; and approach DLL families with a strength-based framework. Home environments may develop into enriched learning environments when programs implement home-visiting practices, engage DLL families around literacy-building practices, and encourage children's oral-language development in the home. Programs may also extend DLL learning into the community by connecting DLL families with community resources, providing field trips, and utilizing parent liaisons. Several evidence-based, promising programs exist that help to strengthen the relationship between DLL families and ECE programs. In sum, ECE programs are in a unique position to help DLL families use their cultural and linguistic resources in ways that promote DLLs' learning and development.

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Paper 5

Assessment of Young Dual Language Learners in Preschool

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The accurate and valid assessment of young DLLs' development and achievement is essential to individualizing instruction and improving the quality of education they receive (Espinosa 2008; Espinosa and Garcia 2012). Individualized instruction in preschool enhances the learning opportunities of young children and promotes the important developmental outcomes identified in the *California Preschool Learning Foundations, Volume 1* (California Department of Education 2008).[*] All California preschool programs are responsible for providing high-quality educational services that "individually assist each child to move along a pathway of healthy learning and development" (California Department of Education 2008, xi). Individualized instruction, however, can be accomplished only through comprehensive, ongoing assessments that are fair, technically adequate, and developmentally valid so that we can determine if children are making progress toward the intended outcomes (Snow and Van Hemmel 2008). That is, individual child assessments must be linguistically, culturally, and developmentally appropriate in order to know how children are progressing and what educational decisions need to be made.

The chronic academic underachievement of the DLL population across the nation, as well as in California (Galindo 2010)—and their lower school readiness scores in mathematics and literacy at kindergarten entry (Cannon and Karoly 2007; Lee and Burkham 2002)—clearly reveal the need for more effective assessment approaches that are linked to improved instruction for young DLLs. This paper is organized around the following questions:

1. What are the important linguistic, cultural, and background factors to consider in the assessment of young DLLs?
2. What are the most appropriate methods for assessing young DLLs for certain purposes (e.g., instructional improvement and developmental screening)?
3. What technical considerations are required for testing DLLs?
4. What do preschool teachers need to know about valid assessment of DLLs?

It is important for preschool educators to understand the long-term trends in academic achievement for young DLLs so that improved assessment strategies can be implemented by preschool programs to support the learning and development of young DLLs.

[*]The California Preschool Learning Foundations are aligned with the Common Core State Standards. For further information, see *The Alignment of the California Preschool Learning Foundations with Key Early Education Resources: California Infant/Toddler Learning and Development Foundations, California Content Standards, Common Core State Standards, and Head Start Child Development and Early Learning Framework*.

Need for Linguistically and Culturally Appropriate Individualized Assessments

To accurately assess young DLLs, one must consider the unique aspects of linguistic and cognitive development associated with acquiring two languages during early childhood, as well as the social and cultural contexts that influence overall development. Decades of research have clearly shown that all children are capable of successfully learning and benefiting from two languages during the early childhood years (Bialystok 2009; Bialystock and Feng 2010; Garcia 2005; Paradis, Genesee, and Crago 2011).[†] Nevertheless, important individual and contextual differences may affect the development of essential skills that are necessary for preschool performance. For example, within the context of the United States generally, and California in particular, young DLLs are much more likely to have parents without a high school education, to live in low-income families, and to be raised in cultural contexts that may not reflect majority culture norms, compared with monolingual children (Capps et al. 2005; Espinosa 2007; Hernandez 2006).

Poverty is one of the characteristics most strongly associated with DLLs' lower performance on many common assessment measures (Duncan and Magnuson 2005). Analysis of the nationally representative Early Childhood Longitudinal Study–Kindergarten Cohort (ECLS-K) data set reveals that young Latino DLLs at school entry are more likely to live in low-income homes (Espinosa, Laffey, and Whittaker 2006), with both parents, and have a mother who is less likely to work outside the home than their European American or African American peers (Crosnoe 2005). In addition, young DLLs from homes where an Asian or European language is spoken are less likely to experience poverty and low levels of academic achievement than young Latino, Spanish-speaking DLLs (Espinosa, Laffey, and Whittaker 2006). Low-income Latino children in the ECLS-K sample scored more than half a standard deviation below the national average in math and reading achievement at kindergarten entry (Lee and Burkham 2002). In addition, this analysis of the ECLS-K data set by language type revealed that when compared as a group, the DLLs scored below their native English-speaking peers on school-age math and reading assessments. However, when DLLs are compared by language background, the findings are more nuanced:

> In general . . . children from European and Asian speaking homes do as well or better than their English-speaking counterparts. Children from

[†]See Paper 1, Neuroscience Research, and Paper 2, Development Across Domains, for a fuller discussion of cognitive and linguistic benefits of early bilingualism.

> Spanish-speaking homes are behind all other language groups. The difference is pronounced when the achievement scores of the Spanish-speaking children who score lower than the English proficiency cutoff are compared to the English speaking children or to the Spanish-speaking children who score above the cutoff score. (Espinosa, Laffey, and Whittaker 2006, 52)

The Spanish-speaking children who had basic English proficiency (i.e., passed the Oral Language Development Screener) and were not in the lowest socioeconomic status (SES) quintiles demonstrated achievement at rates that were comparable with their monolingual English-speaking peers. It is important for preschool administrators, staff, and teachers to understand the impact of these factors on the academic readiness of young DLLs and, ultimately, their achievement during the school years. By doing so, educators can determine how to design the most appropriate and effective interactions, instruction, and assessment of DLLs.

One of the reasons Latino DLLs are the most likely to experience academic delays compared with other minority children of similar socioeconomic characteristics (National Center for Education Statistics 2007) is that their language needs are not sufficiently addressed during the preschool years. Latino DLLs frequently do not exhibit age-appropriate vocabulary or academic readiness in either their home language (Spanish) or English when they enter kindergarten (St. Pierre et al. 2001; U.S. Department of Health and Human Services et al. 2001, U.S. Department of Health and Human Services et al. 2003), and their unmet language needs are one of the primary causes of reading and academic delays during the school years (Carlo et al. 2004; Storch and Whitehurst 2002). As with native speakers of English, certain early literacy skills, such as decoding in addition to oral language skills, have been shown to be important for reading comprehension with DLL populations (Espinosa and Zepeda 2009; Kieffer 2008; Mancilla and Lesaux 2010). Although decoding skills appear to develop at appropriate rates when DLLs receive high-quality instruction, their reading comprehension abilities are far below age and grade expectations beginning in first and second grade and persisting through high school. In fact, low-income DLLs' knowledge of vocabulary has been shown to be two standard deviations below the national norm in preschool and at kindergarten entry (Hammer et al. 2009; Páez, Tabors, and López 2007). With targeted instructional support, DLLs appear to develop the prerequisite decoding skills during the early childhood years, but

not the linguistic capacity to understand the text they are decoding. Thus, both SES and the child's level of language development need to be considered in any evaluation of his or her academic readiness.[‡]

In addition to factors such as poverty, parents' educational level, and related SES variables, a child's performance may vary due to differences in home language experiences (Hammer, Scarpino, and Davison 2011), the timing and reasons for family immigration (Portes and Rumbaut 2005), the age of first exposure to English (Hammer, Scarpino, and Davison 2011), as well as differences in cultural beliefs and child socialization practices across families (Laosa 2006; see Paper 4, Family Engagement). To individualize instruction, preschool administrators and teachers must consider the impact of these factors and then carefully determine how to best promote language and academic readiness within the preschool curriculum. Thus, child assessments should provide sufficient information about the family and the child's language environment at home so that the specific contextual factors influencing each child's development may be carefully considered and instruction be individualized. Child assessments should also help to identify early on which children should be referred for further evaluation, which in turn may indicate a need for intervention.

The next section of this paper will describe appropriate methods for assessing young DLLs for specific purposes (see also Paper 3, Program Elements and Teaching Practices, for further information).

Assessing Young Dual Language Learners for Specific Purposes

A cardinal rule in the selection of assessment measures is that the purpose of the assessment must guide assessment decisions. As stated by Snow and Van Hemel in the National Research Council Report on Early Childhood Assessment, "Different purposes require different types of assessments, and the evidentiary base that supports the use of an assessment for one purpose may not be suitable for another" (Snow and Van Hemel 2008, 2). For example, assessment strategies utilized by teachers for daily instructional purposes are typically less formal than assessment strategies employed by administrators for program accountability or evaluation purposes. This approach is consistent with the *Principles and Recommendations for Early*

[‡]See Paper 2 for full discussion of the cognitive consequences of dual language development, including advantages of bilingualism. See also chapter 6, "Alternative Educational Programs for English Learners," of the edited volume *Improving Education for English Learners: Research-Based Approaches* (CDE 2010d) for a discussion of how dual language learners with competence in both English and the home language attain higher levels of academic achievement than dual language learners with lower levels of competence in the two languages.

Childhood Assessments developed by the National Education Goals Panel (Shepard, Kagan, and Wurtz 1998). Four broad purposes for early childhood assessments were established:

1. To promote learning and development of individual children;
2. To identify children with special needs and health conditions for intervention purposes;
3. To monitor trends in programs and evaluate program effectiveness;
4. To obtain benchmark data for accountability purposes at local, state, and national levels.

To date, each of the above noted purpose for assessment requires its own instruments, procedures, and technical standards and has carried its own potential for cultural and linguistic bias. Although there may be some similarities across the different types of assessment, it is nevertheless critical to understand the unique considerations and recommendations for assessing DLLs according to each of the stated purposes. Ideally, a truly comprehensive and integrated assessment system that addresses all four purposes for DLLs would employ a congruent set of measures and procedures; reflect the learning expectations identified in the *California Preschool Learning Foundations, Volumes 1–3* (California Department of Education 2008; 2010a; 2012a); provide a coherent profile of the functioning and progress of children, classrooms, and programs; and be adequately sensitive to capture DLLs' important developmental changes over time and preschool program effects. Currently, most assessments across the four purposes are not congruent, do not assess the same developmental constructs, and are difficult to integrate. For purposes 1 and 2, standardized assessment instruments that have not been validated for populations of young DLLs are frequently utilized (see Espinosa and Lopez 2007 for a complete discussion of this issue). As the primary audience of this paper is preschool teachers, program directors, and curriculum supervisors, this paper will focus on purposes 1 and 2 noted above.

Both Languages Need to Be Assessed

Becoming proficient in a language is a complex and challenging process that takes many years for children of all ages (Hakuta, Bialystok, and Wiley 2003). As with any type of learning, children will vary enormously in the rate at which they learn languages. The speed of language acquisition depends on factors within the child and in the child's learning environment. The child's personality, aptitude for languages, interest, and motivation interact with the quantity and quality of language inputs and opportunities for use to influence the rate and eventual fluency levels. As children acquire a second language, one language may be more

dominant because they use that language more often than the other at a particular point in time. If children are assessed only in their least-proficient language, their abilities will be underestimated. Frequently, children demonstrate a *language imbalance* as they progress toward bilingualism. Depending on experiences and learning opportunities, children may not perform as well as native speakers of each language in all domains. This is a normal and, most often, a temporary phase of emergent bilingualism (Paradis, Genesee, and Crago 2011).

Barry McLaughlin (1984, 1995) has made a distinction between children who learn a second language *simultaneously* with the first language and those who learn one *sequentially* after learning the first language. When a child learns two languages *simultaneously* (e.g., during the first years of life), the developmental pathway is similar to how monolingual children acquire language. In fact, the majority of young children in the world learn two languages (or more) from the first years of life (Reyes and Moll 2004).

In contrast, the language development of children who learn a second language sequentially—that is, after the first language is established or from about three years of age onward—follows a different progression and is highly sensitive to the characteristics of the child as well as the language learning environment. At this point, the basics of the child's first language have been learned. Children know the structure of one language, but now must learn the specific features—grammar, vocabulary, and syntax—of a new language. According to Tabors and Snow (1994), *sequential* second-language acquisition follows a four-stage developmental sequence for children acquiring English:[§]

1. *Home Language Use*. When a child has become competent in one language and is introduced into a setting where everyone is speaking a different language (e.g., a young dual language learner entering an English-dominant preschool classroom), the child will frequently continue to speak his home language even when others do not understand. Parent interviews and observations should be conducted to determine the child's ability to communicate in the home language with peers and family, as well as the early language learning opportunities available to each DLL. A child who does not show age-appropriate home language skills might be at risk of a language delay and may need a referral for further evaluation.

[§]For further information, see *Preschool English Learners: Principles and Practices to Promote Language, Literacy, and Learning—A Resource* Guide (California Department of Education 2009) and *California Preschool Learning Foundations, Volume 1* (California Department of Education 2008).

2. *Nonverbal Period*. After young children realize that speaking their home language will not work, they frequently enter a period where they may use nonverbal means to communicate. This is a period of active language learning for the child; he is busy learning the features, sounds, and words of the new language (receptive language) but not verbally using the new language to communicate in English (productive language). Any English-only language assessments conducted during this stage of development may result in misleading information that underestimates the child's true language skills. In fact, in order to determine if the child has a language delay, the child's development in the home language must be thoroughly documented. If the child is not using verbal means in the home language, a referral for further evaluation will be needed. If the child shows age-appropriate language skills in the home language, no referral will be needed.
3. *Telegraphic and Formulaic Speech*. The child is now ready to start using the new language and does so through telegraphic speech that may involve the use of formulas. This is similar to a monolingual child who is learning simple words or phrases (content words) to express whole thoughts. For instance, using telegraphic speech a child might say, "me down," indicating he wants to go downstairs. *Formulaic speech* refers to unanalyzed chunks of words or sometimes even syllables strung together that are repetitions of what the child has heard. For example, Tabors (1997) reported that young DLLs in the preschool frequently used the phrase "Lookit" to engage others in their play. These are phrases the children had heard from others that helped to achieve their social goals, even though the children probably did not know the meaning of the two words and were only repeating familiar sounds that were functionally effective. Children performing at this stage in their acquisition of the second language *should not be assessed only in English* because their performance in that language is likely to show limited academic skills. An assessment in the home language will help determine what the child is capable of doing academically. This assessment is critical also to determine if the preschool child is able to use complete sentences to express her thoughts in that language. A preschool child who does not demonstrate these skills in either language will need a referral for further evaluation.

4. *Productive Language*. Now the child is starting to go beyond telegraphic or formulaic utterances to create her own phrases and thoughts. Initially the child may use very simple grammatical patterns such as "I wanna play," but over time, she will gain control over the structure and vocabulary of the new language. Errors in language usage are common during this period as children experiment with their new language and learn its rules and structure. In contrast, the assessment in the home language should show that the child usually does not make errors when she produces sentences in that language. Depending on the literacy experiences at home, young DLLs may know certain words in the home language, but not in English, and as a result, they may have a smaller English vocabulary than monolingual speakers of English (Hammer, Scarpino, and Davison 2011; Páez, Tabors, and López 2007). For example, young DLLs may know the names of objects in the kitchen and home in Spanish but not in English. They may also know words such as *recess, chalk, line,* and *scissors* in English because these are the words they are exposed to at school. However, they never learn the same words in Spanish because there was no need or opportunity to do so in the home. In those cases, the child may appear as if he has limited vocabulary in each language. However, when the total number of words the child knows in both languages is considered together, it is often comparable to the number and range of vocabulary words that monolingual children know.

In short, a child's limited second-language skills are likely to affect performance in any preschool assessment. All young DLLs will need specific, individualized instruction that is based on their stage of English language development (ELD) and focused on vocabulary and oral language skills in order for them to make substantial academic progress. Children should be assessed in both languages because assessing a child only in English will underestimate his or her knowledge and true abilities. The assessment in the home language will help determine what the child has learned and is capable of doing as well as the child's level of language development. A child who demonstrates difficulties in both languages should be referred for an evaluation to determine the need for services.

Code Switching/Language Mixing

Code switching (switching languages for portions of a sentence) and *language mixing* (inserting single items from one language into another) are normal aspects of second-language acquisition (Paradis, Genesee, and Crago 2011). This phenomenon occurs in both simultaneous and sequential bilingualism. It does not mean that the child is confused or cannot separate the languages. In some cases, children mix the two languages in one communication because they lack sufficient vocabulary in the target language to fully express themselves. In other cases, in particular when children are raised in bilingual communities in which adults code-switch, children may do so because of their exposure to code switching. Research has shown that even proficient adult bilinguals mix their languages in order to convey special emphasis or establish cultural identity (Garcia 2009). In any case, code switching, or language mixing, is a normal and natural process that teachers need not be concerned about. In fact, language mixing has been shown to be a linguistic resource that indicates growing proficiency in both languages (Paradis, Genesee, and Crago 2011). The goal must always be on *enhancing communication,* rather than enforcing rigid rules about which language or how each language should be used by the child at a given time or under certain circumstances. See Paper 3, Program Elements and Teaching Practices, for a discussion of instructional practices to support young dual language learners in preschool.

Young children who have regular and rich exposure to two languages during the early childhood years can successfully become bilingual. Most research concludes that, with sufficient language exposure and usage, there are negligible negative effects of bilingualism on the linguistic, cognitive, or social development of children (see Paper 2, Development Across Domains). Most research shows significant advantages in certain areas of development, particularly in executive function or cognitive control skills, and that preschool may be an ideal time to learn two languages (Bialystok 2001; Genesee 2003; Paradis, Genesee, and Crago 2011; Kuhl 2009).[**]

In summary, simultaneous bilingualism follows a path similar to monolingual development, and sequential second-language acquisition occurs in a predictable series of stages or waves. In both cases, it is typical for one language to dominate or be more developed than the other at

[**]See Paper 1, Neuroscience Research, and Paper 2, Development Across Domains, for a complete discussion of the benefits of early bilingualism.

any given time, depending on the amount of exposure to and time spent communicating in each language.

Language Proficiency and Dominance

The first issue facing educators who work with DLLs is to determine the proficiency in each language as well as the distribution of knowledge across the two languages. Young DLLs, whether simultaneous or sequential second-language learners, most likely will have a dominant language (Paradis, Genesee, and Crago 2011), even though the differences may be subtle. Before educators can decide on a child's developmental status, educational progress, or the need for educational intervention, it is necessary to know the language in which the child is more proficient. Typically, the young DLL will have a larger vocabulary, or a specialized vocabulary, along with greater grammatical proficiency and mastery of the linguistic structure of one of his languages. This is the language the child has had the most exposure to, uses more fluidly, and often prefers to use (Paradis, Genesee, and Crago 2011; Pearson 2002). Young DLLs should first be assessed in their dominant language (for sequential second-language learners, it is most often the home language) to determine the upper limits of the child's linguistic and cognitive abilities. (Refer to the assessment matrix below for suggested methods and instruments to determine a child's dominant language.)

There are no individual child assessments specifically designed to determine language dominance. Paradis, Genesee, and Crago (2011) have recommended that educators ask the parents/family members about the child's earliest language exposure to determine early language learning opportunities. Research indicates that the amount of input, frequency of use, and the parents' estimates of language ability highly relate to the level of proficiency in the language (Gutiérrez-Clellen and Kreiter 2003). Accurately determining the language proficiency of a monolingual preschooler is not an easy task under the best of circumstances; when the child is learning two languages, the challenge is increased significantly. (See appendix A for an example of a family interview that can be conducted to collect information on family language usage patterns.)

As stated earlier, young DLLs' skills must be assessed in both their home language and English. One reason is that while a child is learning English, she may show greater initial progress in the home language and limited progress in the second language. Another reason is that research shows that when the child's achievements are examined in the home language,

teachers can also make fairly accurate predictions about the child's potential for learning in the second language (Gutiérrez-Clellen 1999; Gutiérrez-Clellen, Simon-Cereijido, and Sweet 2012). If the young DLL is able to learn age-appropriate concepts in the home language, it is probable he will be able to transfer this knowledge to English language learning. As there is much variability in the amount and quality of English exposure as well as home language development, young DLLs will show uneven progress between the two languages, depending on the language tasks. For example, a child may be proficient in one language for one task (e.g., letter naming, simple vocabulary) but not for another (e.g., listening comprehension) (Valdés and Figueroa 1994). Another child may be able to hold a simple conversation in English but be unable to answer questions about a story or a sequence of pictures in that language (Gutiérrez-Clellen 2002). Because of this variability and the fact that knowledge is mediated by language, it is impossible to obtain an accurate measure of progress without examining development in the two languages.

Observational Assessment for Instructional Decision Making and Improvement

Informal, indirect methods of observing young DLLs' interactions and language use can provide important information on the child's level of language development or proficiency. Research has shown that teachers can be reliable in estimating a child's level of proficiency and English use based on their observations of the child (Gutiérrez-Clellen and Kreiter 2003). This type of assessment is often referred to as *authentic,* meaning that ongoing observations of children's behavior and use of language over time in the natural classroom environment are less contrived than standardized testing and, if aligned with curriculum goals, can be critical to instructional planning. Observations, language samples, and interviews are considered authentic methods because no specific patterns of correct responses are assumed; instead, they aim to describe a child's skills and knowledge in the context of the natural classroom environment. Observations and insights from other staff members who speak the child's home language and have contact with the child—for example, bus drivers and family or health specialists—can be collected through standardized questionnaires or family interviews[††] (Espinosa 2006; Gutiérrez-Clellen 2006).

In addition to information from parents, staff, and teachers, language development may be assessed directly by asking children to talk about a past event or personal experience or by

[††]See appendix A for an example of questions to pose in a family interview.

talking about a storybook using story retellings. These are also considered authentic assessment methods because they seek to evaluate what the child can do with language using spontaneous language samples. Through these language tasks, children can show their ability to produce and comprehend a language. Adults can model a statement about each picture (e.g., "This is John and his frog"; "One day they went to the park") and then ask the child to retell the story while looking at the pictures. Through this approach, it is possible to determine if a preschool child has sufficient mastery of the target language to comprehend the main actions in the story and to use complete sentences to talk about it. A staff member who is fluent in the child's home language can use this type of language assessment in English or the home language, and the results can then be used to compare the child's functioning in English and the home language.

Observational approaches that are aligned with curriculum goals, focus on educationally significant outcomes, rely on data from multiple sources gathered over time, and include families are recommended by the leading early childhood education (ECE) professional associations to improve and individualize instruction (National Association for the Education of Young Children (NAEYC) and National Association of Early Childhood Specialists in State Departments of Education [NAECS/SDE] 2003). Frequent and ongoing assessment for instructional improvement and adjustment include observations of each child's performance, checklists, rating scales, work samples, and portfolios during everyday activities (Espinosa 2008). In order to accurately collect data on the emerging competencies of young DLLs, assessors need to understand typical development of young children who are growing up with more than one language, their home languages, and their cultures.

In California, all state-funded preschool programs are required to administer the *Desired Results Developmental Profile–Preschool, DRDP-PS© (2010)* (California Department of Education 2010c). Preschool teachers complete this observational child assessment twice a year to measure children's progress toward the Desired Results or learning expectations. The assessment results are then used to inform instructional planning for individual children as well as to adjust instruction for groups of children. This child assessment is part of a larger Desired Results (DR) system that includes information from parents, a measurement of the quality of the program environment (ERS), and an annual Program Self-Evaluation.

The DRDP-PS© (2010) is aligned with the *California Preschool Learning Foundations, Volume 1* (California Department of Education 2008), and the group of measures included in a

particular domain capture the most salient, observable constructs, as well as the breadth of each domain in the *California Preschool Learning Foundations, Volume 1* (California Department of Education 2008). Each measure provides detailed examples of children's behavior that indicate progress on a continuum of development. The validity and reliability of the DRDP© (2010) have been established through multiple studies conducted over the past 10 years. The DRDP-PS© (2010) includes 12 domains of development to be assessed. DLLs' English-language development in preschool is measured within the domain of English Language Development (ELD) and has four measures: Comprehension of English; Self-expression in English; Understanding and response to English literacy activities; and Symbol, letter, and print knowledge in English. Furthermore, in its DRDP© training documents, the California Department of Education, Child Development Division (CDE/CDD) has stated:

> The teacher who completes the assessment for a child who is a dual language learner should speak the child's home language. If not, the teacher must receive assistance from another adult, such as an assistant teacher, director, or parent, who does speak the child's home language. It is important that the program plans for time during the day when the child and adult have time to interact if the adult is not the child's parent or the assistant teacher in the child's classroom. (California Department of Education 2010c, 13)

These same measures are included in the DRDP–School Readiness (DRDP-SR©) instrument for use in transitional kindergarten and kindergarten. Further, in the guidance for the DRDP-SR© the CDE/CDD states:

> For children who are dual language learners, complete both the LLD [Language and Literacy Development] and ELD [English-Language Development] measures. The ELD measures are used to document and assess progress in learning to communicate in English. The LLD measures are used to assess progress in developing foundational language and literacy skills. Children who are dual language learners may demonstrate mastery of developmental levels in their home language, in English, or in both . . . Children who are dual language learners will vary substantially in their acquisition of English language competencies, depending on factors such as the degree of exposure to English, level of support provided in their home language, and their motivation to acquire English . . . Overall, the development of language and literacy skills in a child's first language is important for the development of skills in a second language, and therefore should be considered as the foundational step toward learning English. (California Department of Education 2012b, vii)

This guidance to teachers is intended to ensure that the assessors of DLLs have the capacity to judge the child's abilities in any language, not just in English. Especially for children who are in the early stages of English acquisition, it is crucial that someone who is proficient in the

children's home language determine their understanding of mathematical concepts, their social skills, and their progress in the other developmental domains. Without an assessor who is fluent in the child's home language and properly trained to conduct the assessment, it is not possible to obtain accurate results. For example, an assessor who does not understand the language a child is using when communicating to a peer would find it difficult to determine if that child is displaying empathy for others.

In the authors' judgment, the DRDP-PS© instrument represents a major accomplishment in providing a reliable and valid tool for teachers to assess English language development during the preschool years. There is also professional development made available to program staff on all aspects of the administration of the DRDP and how to use the results for educational planning. Professional development is critical to the utility of the DRDP in improving targeted instruction for individual children as well as for improving the quality of services for groups of children. Yet it does not provide specific guidance on how to determine if children are progressing at age-appropriate levels in their home language. For example, some measures in the Language and Literacy Development domain describe development related to specific features of language (such as grammar or phonological awareness) in English, which may or may not be applicable to development in other languages. In addition, the current version of DRDP does not account for cultural variation in how young children engage in learning at home—for example, the way they are taught math concepts. These may be important additional features of the DR system that can be developed in the future and will enhance the quality of instruction and assessment in programs that serve DLLs. The assessment methods discussed earlier should complement current information obtained by the DRDP and help teachers differentiate instruction for these children.

Assessment for Screening and Referral of Children Who May Have Special Needs

Developmental screening is the process of early identification of children who may be at risk of cognitive, motor, language, or social–emotional delay and who require further assessment, diagnosis, and/or intervention. Currently, a large number of young Latino and other DLLs with special needs are not identified. Nationwide, the percentage of Latino preschoolers with disabilities (15 percent in 2004) is smaller than the percentage of preschoolers in the general population identified with special needs (National Center for Education Statistics 2007). This trend changes in later grades. Rueda and Windmueller 2006 reported that in

California school districts with high proportions of English l learners (ELs) (this term is commonly used in the K–12 grades for children who speak a language other than English at home and are not fully proficient in English) and high poverty levels, there was an overrepresentation of EL children in special education emerging by fifth grade that continued throughout the school years until grade twelve.

Service providers are also challenged to provide services to a growing number of Latino children ages birth to five years of age. In fact, recent reports from the U.S. Census Bureau state, "Overall, the Hispanic population grew by 2.2 percent, or more than 1.1 million, to just over 53 million in 2012. The Hispanic population grew primarily because of natural increase (births minus deaths), which accounted for 76 percent of Hispanic population change (U.S. Census Bureau 2013)." About a quarter of the children in the United States from birth to age five are Latino (U.S. Census Bureau 2009). With regard to linguistic diversity, the California Department of Education (CDE) reports that 23.2 percent of children in K–12 public schools are dual language learners (California Department of Education 2012c, as cited in Paper 3). While there are no precise estimates for the size of the DLL population in preschool, the Office of Head Start reports that approximately 40 percent of the participating families are of Latino descent; 30 percent of participants were from families that primarily spoke a language other than English at home; and 25 percent were from families that primarily spoke Spanish at home (U.S. Department of Health and Human Services, Administration on Children, Youth and Families, Office of Head Start 2012), yet Latino children are less likely to receive services compared with those from other ethnic backgrounds (Morrier and Gallagher 2012). Both nationally and in California, 2 percent of all Latino children ages birth to three years receive services, a smaller percentage than the percentage of infants and toddlers of all races and ethnicities nationwide (9 percent) and in California (5 percent) (U.S. Department of Education 2008). Clearly, there is a need to improve the methods used for screening young Latino DLLs who may need special services.

Typically, brief standardized developmental screenings are administered to large numbers of children to determine if there is a potential problem and if referral for more in-depth assessment is warranted. Standardized instruments are most often used for this purpose since comparisons of one child's development against other similar children is required to determine if the child is developing within normative range or may have developmental delays. As was

discussed earlier, screenings should also be conducted in the two languages (Barrueco et al. 2012; NAEYC and NAECS/SDE 2009).

The use of culturally and linguistically appropriate screening tools and procedures is a challenge when screenings are conducted with young DLLs. Most standardized screening tools have not been designed or normed for young bilingual children and have serious limitations when used with young DLLs. Most teachers and assessment professionals have not been trained to conduct unbiased assessments with children from culturally and linguistically diverse backgrounds; many of them do not speak the child's native language and are not familiar with the home culture; and many teachers lack knowledge of the psychometric characteristics of tests and therefore cannot make informed judgments about the appropriateness of specific tests when their students are from linguistically diverse backgrounds (Sanchez and Brisk 2004).

Finally, assessors need to be able to distinguish between *language differences* attributable to growing up with two languages and *language delays*, which may require specialized language interventions (Espinosa and Lopez 2007). For all of these reasons, it is important for assessors to employ multiple measures and sources of information, consult with a multidisciplinary team that includes bilingual experts (e.g., speech therapists and psychologists who speak the home language), collect information over time, and include family members as informants when making any screening recommendations (Barrueco et al. 2012; Espinosa and Lopez 2007).

Response to intervention models may help differentiate children with special needs from typical learners who may underachieve due to differences in English proficiency, literacy experiences, or educational opportunity (e.g., Linan-Thompson et al. 2006). However, the efficacy of these models for distinguishing the language development of young DLLs with language disorders from young DLLs with typical language development has not been evaluated. In many cases, these children do not receive speech and language services until their performance significantly lags behind their peers. Appropriate screenings and early assessments in the two languages are critically needed to better understand how to provide differentiated instruction for these children. See Paper 6, Early Intervention and Special Needs, for a more complete discussion.

Technical Requirements for Assessment Instruments Administered to Young Dual Language Learners[‡‡]

All assessments administered to young DLLs must meet industry standards for reliability and validity as well as be linguistically and culturally appropriate for the populations of children to whom they are administered. Assessments are valid and reliable when they account for the linguistic and cultural factors related to DLLs throughout the design, administration, and interpretation processes.

Reliability includes the extent to which an assessment yields consistent information across time (test-retest reliability) and with different assessors (interrater reliability), and the degree to which scores within a given test are correlated (internal consistency). Reliability estimates help to establish confidence that an assessment is consistently and objectively measuring the same dimension of development regardless of who is conducting the assessment and when it is administered. *Validity* refers to the degree to which the assessment is actually measuring the knowledge and skills it is intended to measure. Although there are multiple forms of validity, an important dimension of validity for young DLLs is construct validity: the extent to which a given assessment captures the domain of interest. The performance of school-age young DLLs on achievement assessments administered in English is greatly influenced by their level of English proficiency (Abedi 2010). Therefore, scores of mathematical and literacy skill development may reflect the level of a child's English proficiency rather than their knowledge of numeracy, phonological awareness, basic concepts, and so on.

In addition to meeting the standards for reliability and validity, assessments must address the unique cultural and linguistic features of dual language development. Currently, there are multiple limitations to existing assessment approaches employed with DLLs; the scope of this paper does not allow a complete discussion of the major issues (see Espinosa and Lopez 2007 or Espinosa 2008 for a more complete discussion of the technical and administrative considerations). For assessments to be linguistically and culturally appropriate, the assessment or test should describe the characteristics of the children used to norm the measure (i.e., standardization sample). It should also assess the same content in each language, and the items should be equivalent across language versions (i.e., semantic equivalency). These important considerations are described below.

[‡‡]Adapted from Espinosa and Garcia 2012.

Standardization Sample. Was the measure standardized with samples of children who are similar to the targeted children? This question is key. As DLLs growing up in the United States have two or more languages, it is important that all versions of the assessment have been normed with samples of children who are bilingual and not monolingual. In addition, the socioeconomic conditions and educational levels of the parents of the children in the standardization sample should closely resemble those of the children included in the assessment. Misleading conclusions about language development can be drawn when assessment norms are based entirely on monolingual, middle-class children's development and the children being assessed are growing up in bilingual families and under more deprived circumstances (Snow and Van Hemmel 2008). Underrepresentation in the norming sample can lead to systematic bias when assessment results for young DLLs are interpreted.

Content Equivalence. Are the developmental domains and constructs that are being assessed the same for different cultural groups? Are the topics and items relevant to the language and cultural group being assessed? For example, a vocabulary test given to four-year-old DLLs in Hawaii should probably not ask them to identify words about ice-climbing equipment (e.g., *crampons* or *glaciers*).

Semantic Equivalence. According to Barrueco and others (2012), measures and items within measures must possess the same meaning across languages and dialects. Do the words used in the assessments have the same meanings when translated from one language to another? How were the translations completed, by whom, and do the translations maintain the original meanings? This feature is particularly important when vocabulary development in DLLs of all ages is assessed.

Finally, when assessment measures are developed in more than one language, it is important to carefully review the specific psychometric characteristics in each language. The administration manuals will often include information on the standardization sample, reliability, and validity only in the English version and then conclude that the translated version is appropriate for DLL populations.

The impetus for appropriate and responsive assessment of DLLs is supported by a number of legal requirements and ethical guidelines, which have developed over time. A widely cited set of testing standards can be found in *Standards for Educational and Psychological Testing,* a 1999 publication from the American Psychological Association (APA), the American

Educational Research Association (AERA), and the National Council on Measurement in Education (NCME). In summary, it is inappropriate to use psycho-educational tests developed for and normed with monolingual, English-speaking children to understand the development of children who are learning two languages. As Snow and Van Hemel (2008) noted in the NRC Report, "Assessment tools and procedures should be aligned with the cultural and linguistic characteristics of the child. Moreover, in the case of norm based tests, the characteristics of children included in the normative sample should reflect the linguistic, ethnic, and socioeconomic characteristics of the child" (Snow and Van Hemel 2008, 252).

Steps to Follow in Assessing Young Dual Language Learners

Teachers and practitioners may be guided by specific questions that can help them make decisions during the assessment process (see figure 1). The first question seeks to determine if the child speaks a language (or languages) other than English at home so that the teacher can decide which language(s) to assess. This can be determined through a parent/family interview or questionnaire (see appendix A). If the child uses or is exposed only to English at home, assessments can be conducted in English. If the child speaks another language, assessment must be conducted in both languages. A child with typical language development should show age-appropriate knowledge and language skills in the home language. A child with language learning difficulties will show delays in both languages and should receive further evaluation to address specific developmental needs.

The second question is to determine the child's level of second-language development. Most likely, the DLL will be at one of the stages in English-language development described above, and the preschool curriculum will need to provide a focus on oral language development, early literacy skills, and writing (see California Department of Education 2010b, 177–230). The child's language skills are likely to affect academic readiness if not sufficiently addressed.

The third question focuses on obtaining information about the child's development and skills in the home language. If the child exhibits limited home language development, this will indicate a risk of developmental language delays, and a referral for an evaluation will be needed to develop an intervention plan. If the child shows age-appropriate competencies in the home language, continued language development will be needed to maintain skills and prevent loss of the home language.

The fourth question focuses on the teacher's opinion about the child's ability to learn. Teachers observe the child during learning activities and can evaluate the child's responsiveness during these interactions. Comparing the child to other DLLs can provide critical information about a child's learning potential. Children who are highly responsive in spite of their limited English skills are likely to be successful learners as long as opportunities for teacher-guided interaction and instruction are provided. Children who have limited responsivity to high-quality learning interactions are likely to be at risk of academic delays. In these cases, a full evaluation is needed to determine the course of individualized intervention.

The fifth question determines whether there are any developmental concerns that can affect the child's academic progress and that may need to be addressed directly. To answer this question, it is critical that the measures selected are culturally and linguistically appropriate. Only screening instruments that are administered in the two languages (if both are spoken) will reveal whether a true disability exists. If appropriate instruments are used and the child shows delays in both languages, a full evaluation will be necessary to develop an individualized intervention. If no appropriate instruments are used, the results of such screenings should be interpreted with caution, and additional evidence of concern (e.g., parent report, evaluation of child responsivity) will be needed to provide converging support for a referral.

Finally, as has been discussed above, children may have different skills in each language. Thus, the last question focuses on determining the child's knowledge and skills in each language. By conducting assessments in both languages, critical information about what the child knows and is able to do in each language will be needed to plan instructional activities that address the child's needs in each language. Table 1 lists several methods and instruments that can be used at each step of this process.

What Preschool Teachers and Program Staff Need to Know to Conduct Valid Assessments

Preschool teachers and support staff will be asked to accurately assess young DLLs' development and achievement in order to individualize instruction, improve the quality of education, and improve academic school readiness. As discussed above, this multistep process requires all program staff members to be knowledgeable about certain aspects of the linguistic and cultural development of young DLLs as well as the specific characteristics of the assessment instruments they administer. They will need to understand the stages of English-

language acquisition for preschoolers and the importance of home language development for overall language development and future academic achievement. They will also need to be skilled in observational authentic assessment methods related to curriculum goals and linking ongoing assessment results to individualized instruction (see above section on "Observational Assessment for Instructional Decision Making and Improvement" for further discussion on the types of observation and documentation).

Administrators and program staff must be able to make judgments about the developmental, cultural, and linguistic appropriateness of available instruments to make the best decisions about the use of specific assessments for their DLL children (see Barrueco et al. 2012 for a discussion of strengths of ECE assessments available in Spanish and English).

When reviewing assessment results, teachers and staff need to understand the limitations of standardized instruments used with young DLLs and use their professional judgment when interpreting and applying the assessment results. Assessment in early childhood education is a process that requires teams of individuals who all contribute specialized information about the child; therefore staff must be skilled in team collaboration. Finally, all staff members must be competent in working across cultures to establish effective working relationships with diverse families, many of who may hold distinct parenting values and beliefs (see Paper 4, Family Engagement, for further discussion of collaboration with families with young dual language learners).

Final Conclusions and Recommendations for Preschool Programs

1. Preschool program administrators and staff need to consider the unique linguistic, social, and cultural characteristics of young DLLs when selecting culturally and linguistically appropriate assessment instruments and approaches—and when interpreting results. The characteristics of the children and families served must be considered in decisions about specific assessment instruments.
2. Preschool program staff need to administer carefully selected assessments for specific purposes: in order to determine if a child may be at risk of cognitive, motor, language, or social–emotional delay, which will require further assessment, diagnosis, and/or intervention (developmental screening). Standardized instruments need to be culturally and linguistically appropriate and unbiased as possible. Frequent and ongoing

observational assessment that is aligned with curriculum goals (see DRDP discussion above) conducted by trained assessors must be used to individualize instruction.

3. Preschool program staff members need to assess the proficiency level of young DLLs in both the home language and English by using a variety of informants, multiple sources of data collected over time, and a team that includes at least one member who is fluent in the child's home language.
4. Preschool program administrators and staff need to interpret assessment results cautiously, particularly when evaluating the results of standardized vocabulary assessments. Conclusions should be considered as tentative and continually updated; consider limitations of results of standardized assessment instruments; and complement results with information from other sources, particularly families.
5. All preschool program staff members need to receive professional development on appropriate assessment methods and instruments in order to conduct valid assessments of young DLLs.

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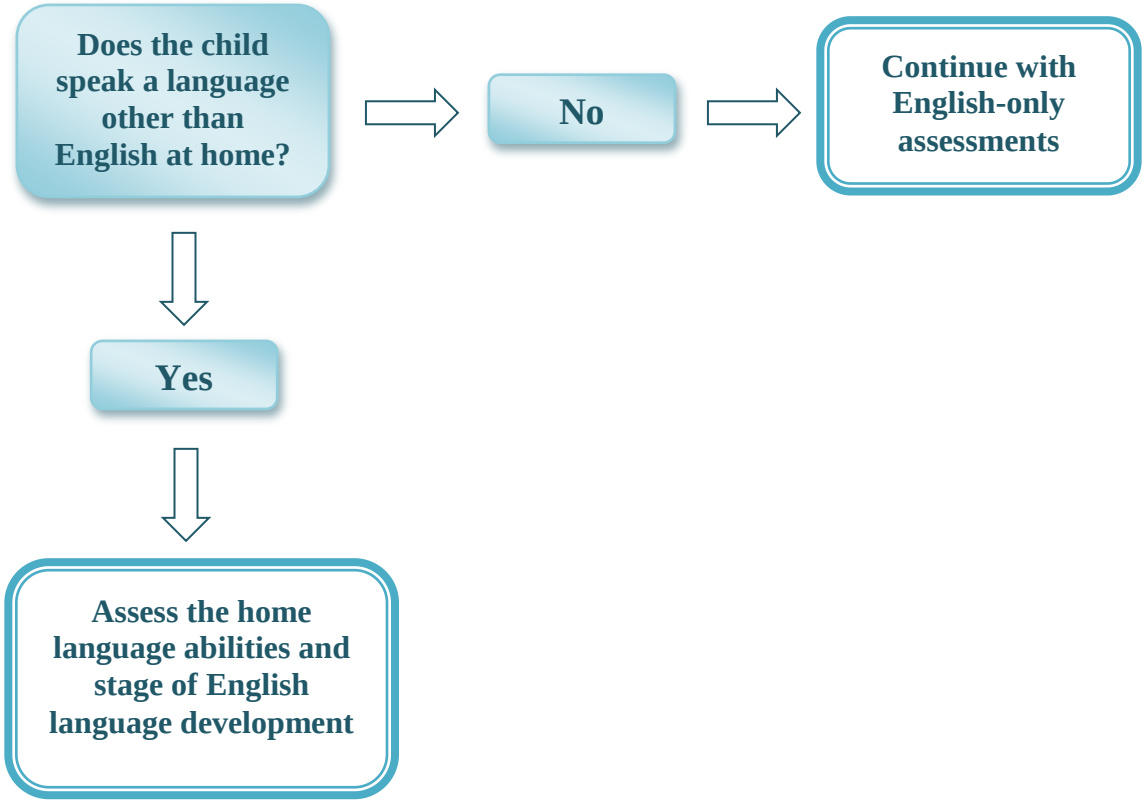
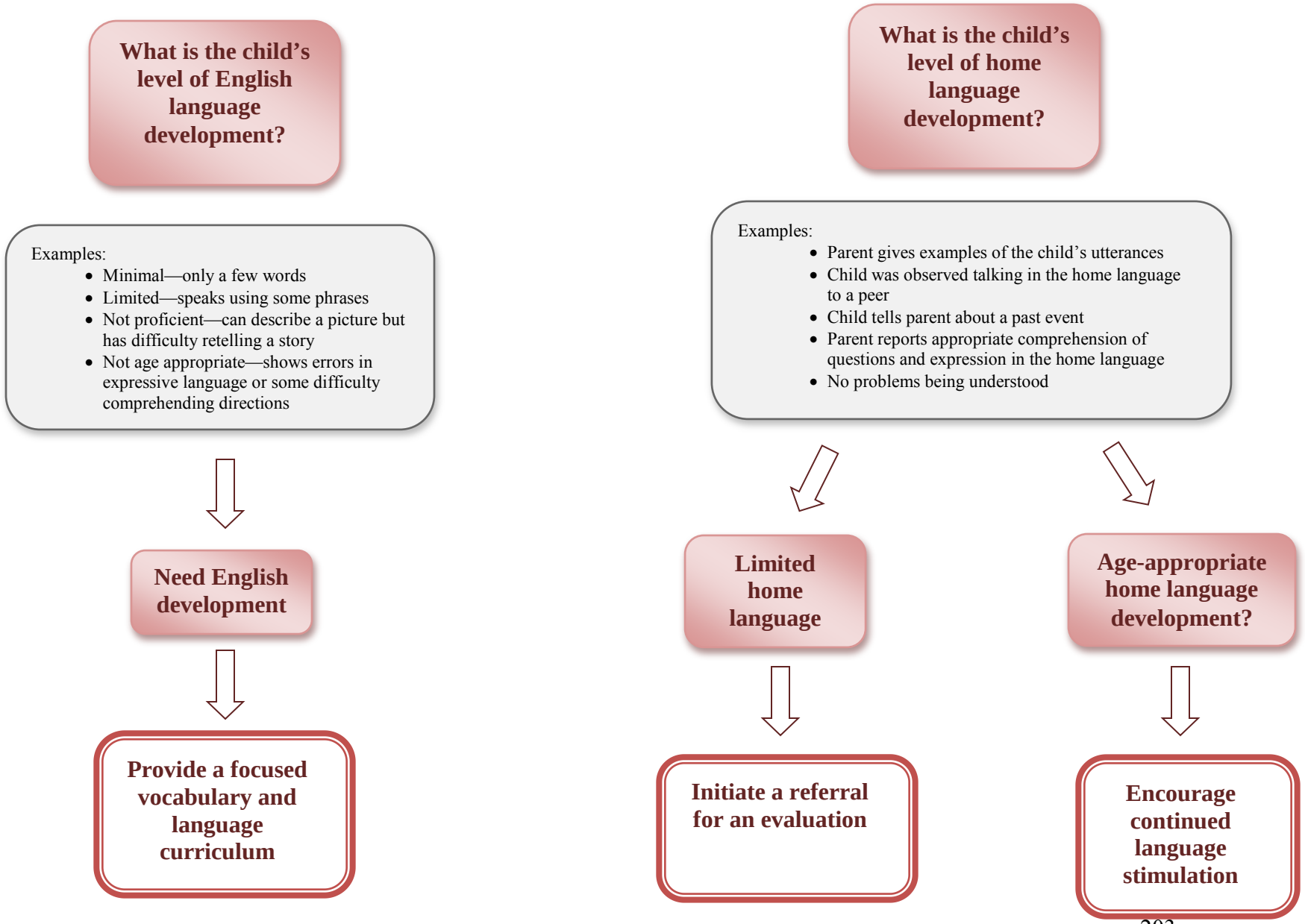
Figure 1. Assessment Process

Step 1: Which language should you use for assessing the child?



Step 2: Should the child be referred for evaluation for a possible language delay?



Step 3: Should this child be referred for evaluation for possible developmental delays?

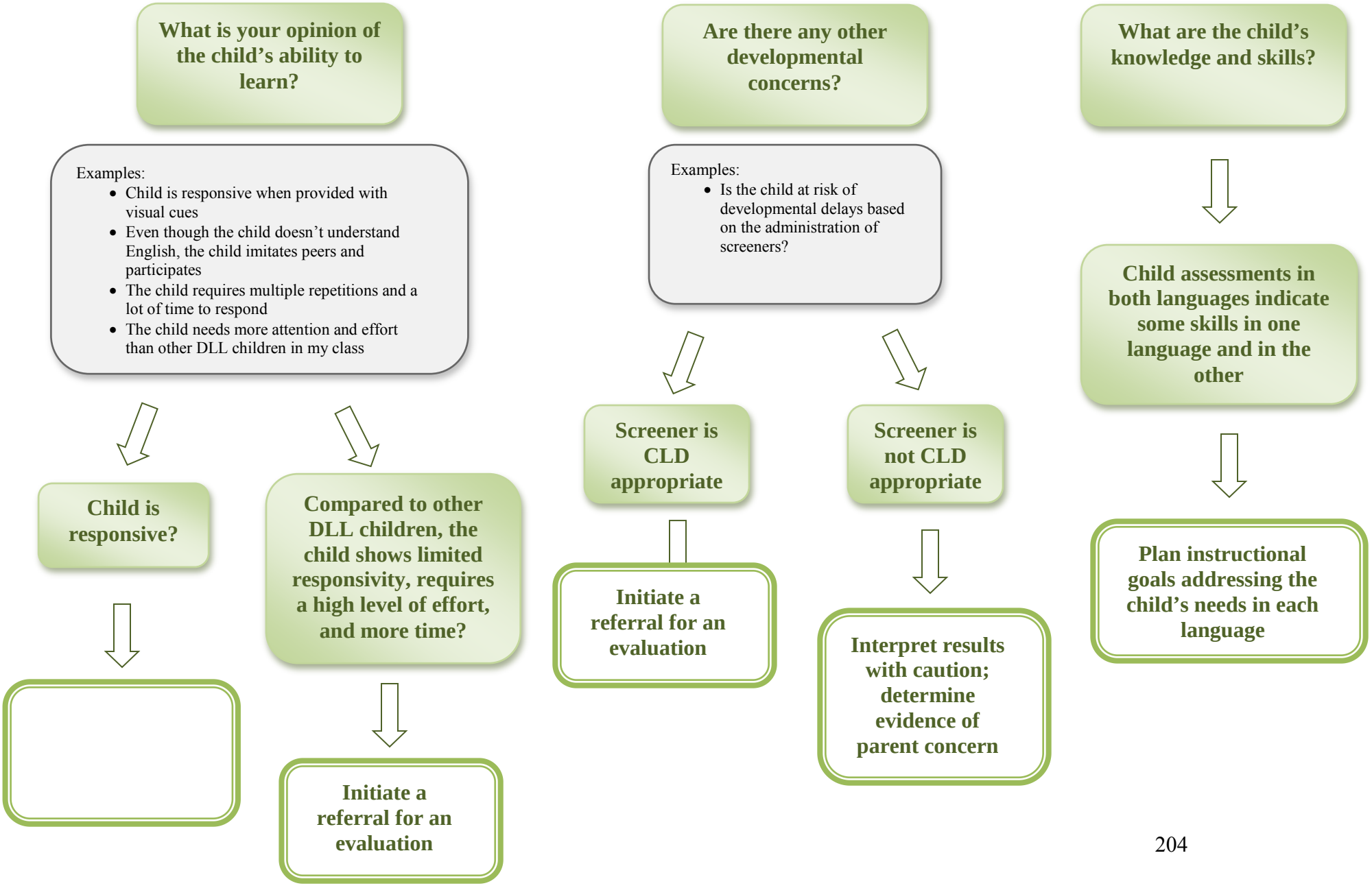


Table 1. Matrix for the Language/Literacy Assessment of Young Dual Language Learners

Purpose of Assessment	Types of Measures/Procedures Recommended[§§]
Determination of Language Dominance/Preference	• Parent/family interview with questions about language usage, interaction patterns, and language proficiency (See appendix A) • Teacher observation of language usage across multiple contexts (DRDP-PS©) • Possibly English language screener • Assessment Team — For each DLL child, obtains answers to following questions: which language does the child have the most experience with, use more fluidly, and most often prefer to use? (Paradis, Genesee, and Crago 2011)
Language Proficiency	• Language samples across multiple settings (in small groups, with peers, with family members, and the like) • Standardized language narratives • Standardized language measures of receptive and productive capacity used cautiously (e.g., *Pre*LAS English and Spanish; Receptive One-Word Picture Vocabulary Test and Expressive One-Word Picture Vocabulary Test; Pre-IPT; and/or Woodcock-Muñoz Language Survey); at certain stages of English language development DLLs will know fewer vocabulary words in each language, which is typical—not a language delay • Teacher ratings/observations
Developmental Screening/Referral	• Collect information in both languages (especially child's dominant language; delays will show up in both languages—if only delayed in English, probably a part of process of English language development) • Use appropriate standardized tests of language abilities cautiously • Collaborate with native language speakers • Observe language usage across multiple settings, in and out of school • Team members make best professional judgment and update frequently

[§§]For more information about many of the assessments mentioned here, see Barrueco et al. 2012.

Language Outcomes	• Informal assessments aligned with curriculum goals in language of instruction (focused teacher–child language interactions) • Observational assessments with items assessing English language development (ELD, DRDP-PS© 2010) • Observational assessments in home language assessing language and literacy measures (Language and Literacy Development domain, DRDP-PS© 2010) • Standardized tests in English and home language aligned with curriculum goals (GOLD, WSS, DRDP-PS© 2010 assessments)

Appendix A

Sample Family Languages and Interests Interview[***]

CHILD'S NAME: _____ Date:_____
First Middle Last

Date of Birth: _____ Gender: □ Male □ Female Age: _____
Month Day Year

1. How many family members live with you and the child? _____

2. Who are the members of your family?

_____

3. Who is the primary caregiver of your child?

_____

4. What language does the primary caregiver speak most often with the child?

_____

5. What language did your child learn when he or she first began to talk?

_____

6. Can you tell me what language(s) each of the following people in your household speak to your child?

	Only English	**Mostly English; some other language (identify)**	**Mostly other language (identify); some English**	**Only other language (identify)**
Mother (or you)				
Father (or you)				
Older siblings				
Grandmother				
Grandfather				
Aunt/Uncle				
Others, after school, community members				

[***]This family survey was developed by Espinosa, Matera, and Magruder for the California Transitional Kindergarten (TK) program in 2010.

7. What are your feelings about maintaining your home language?

_____

8. What special talents or interests does your child have?

_____

9. Who does your child play with most often?

_____

10. What are your aspirations for your child?

_____

11. What are your expectations for the preschool year?

_____

12. Do you have any hobbies or interests that you would like to share with your child's class?

_____

13. Would you be interested in volunteering in your child's class?

_____

14. If yes, preferred day(s) and times:

_____

Paper 6

Early Intervention and

Young Dual Language Learners with Special Needs

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Teachers and families of young dual language learners (DLLs) with special needs frequently raise questions about how to facilitate these children's language development and what language(s) to use in preschool and intervention services. To address these concerns, we reviewed relevant studies in search of evidence-based answers to the following questions:

- Are preschool-age children with special needs capable of learning more than one language?
- How will exposure to more than one language influence the language development of preschool-age children with special needs?
- What are key considerations in choosing the language for intervention when working with young DLLs with special needs?
- What are implications for practice with DLLs in preschool with special needs?

This paper draws from the available research on young DLLs who have a variety of special needs, which often are coupled with difficulties in speech and language development. In general, the following findings are indicated:

- The use of the home language in intervention does not slow the acquisition of the second language.
- Children with language disorders can apply their home language skills when learning a second language; in many cases, this results in a greater rate of English development.
- Children with a range of special needs, including autism spectrum disorders (ASDs) or intellectual disabilities and deaf children with cochlear implants (CIs), can learn more than one language.
- Children whose first language is not stimulated are likely to experience limited potential for growth of the home language. Overall, current research provides support for home language maintenance and bilingual development of young children with special needs.

Research on Dual Language Development of Children with Special Needs

Many professionals mistakenly recommend that children with special needs should be exposed to a single language—that is, the language of the dominant society—to promote language development and later academic success. This recommendation is based on "the prominent belief that input in two languages places unwarranted demands on the deficient

language-learning systems of children with language impairment (LI)[*]. . . This belief has led well-intended professionals to ignore the functional need for both languages of linguistically diverse children" (Kohnert et al. 2005, 255).

Similarly, a recent survey in Canada of 49 bilingual parents of children with autism found that although professional recommendations varied, most professionals were likely to recommend limiting language input to a single language for these children (Kay-Raining Bird, Lamond, and Holden 2012). It is important to note that, despite professional recommendations, 75 percent of these parents were raising children with ASDs to speak two or more languages, and most of them reported that they were successful in doing so.

Despite concern that dual language input will confuse or delay the language acquisition of young children with special needs, emerging research indicates that those children can learn more than one language. Moreover, there is no available evidence that limiting these children to one language will decrease language difficulties or that dual language learning will increase language delays and problems (Kohnert and Medina 2009).

Limitations of the Research Base

Studies examining young DLLs with special needs (ages three to five years) are extremely heterogeneous, given differences in target populations, research designs, and focus of investigations. Target populations include preschoolers with language disorders or specific language impairments, ASDs, intellectual disabilities, and deaf children with CIs. The majority of studies included in this review were conducted in Canada or the United States; two studies were conducted in Australia, two in the Netherlands, and one each in England and Germany. Thus the sociolinguistic environment and the country's political and cultural attitudes toward bilingualism may also influence findings on the language development of young DLLs with special needs. For example, the federal bilingual policy in Canada gives equal status to English and French; so even at a federal-policy level, bilingualism is valued and considered to be additive. In this social context, both languages are encouraged and learned.

In contrast, federal policy in the United States—as evident in the No Child Left Behind Act (NCLB) of 2001 (the reauthorization of the Elementary and Secondary Education Act)—focuses

[*]The Individuals with Disabilities Education Act (IDEA) defines the term *speech or language impairment* as follows: "Speech or language impairment means a communication disorder, such as stuttering, impaired articulation, a language impairment, or a voice impairment, that adversely affects a child's educational performance." [34 CFR §300.8(c)(11]. See http://nichcy.org/disability/specific/speechlanguage for further information.

only on the acquisition of English for children who speak a language other than English at home, with the intent of increasing academic achievement. The NCLB requirement that all K–12 students be tested in English for academic progress reduces the value of other languages (Gándara and Baca 2008; Rumberger and Gándara 2004). In this context, bilingualism is considered to be subtractive because the learning of the second language (i.e., English) replaces and undervalues the home language and culture (Cummins 1994; Tabors 2008).

There are also many differences across studies in research designs, sample sizes, methods of subject selection, and measures to identify outcomes. With the exception of the studies on young DLLs with language disorders, the majority of studies use nonexperimental, descriptive designs and small samples. Further, the available studies also vary in the child's exposure to the language(s), the involvement of parents in the child's program, the nature of the child's intervention and instruction, and the qualifications of interventionists. The majority of studies, with the exception of one study in Germany, include a variety of home languages with the dominant language of instruction being English. Thus, the heterogeneity and limitations of the current research base require that findings be interpreted with caution, as they may not generalize to all children and families.

Children with Language Disorders

Intervention research involving DLLs with language disabilities in preschool is very limited and varies in the ways the languages are alternated or compared (for a review, see Thordardottir 2010). Yet the available studies consistently indicate that children with language disabilities are successful dual language learners. A study comparing the English skills of Spanish-speaking Latino children who have language disorders found that learning a different language at home did not result in developmental differences compared to their monolingual peers with language disorders (Gutiérrez-Clellen, Simon-Cereijido, and Wagner 2008). In that study, 71 Latino children were sampled from a larger study of preschool, kindergarten, and first-grade classes in Southern California. Forty-seven children had typical language development (TLD), and 24 had language impairment (LI). Children's English grammatical skills based on spontaneous language samples were compared across the two groups, and across 53 bilinguals and 28 monolinguals. The results showed that the bilingual children with LI (i.e., 11 children) exhibited the same language patterns and deficits as monolinguals with LI (i.e., 13 children). The fact that these children were using Spanish at home did not make them more impaired. In other words, whether

children spoke Spanish at home was not a determining factor for their level of LI.

Paradis (2010) examined the question of whether DLL children with language disabilities experience a "double delay" (i.e., a delay related to the disorder coupled with a delay related to the learning of a second language) by reviewing available research conducted in Canada with French and English languages. These studies were conducted with French learners whose first language was English or with English learners whose first language was Mandarin or Cantonese. First, she pointed out that across studies, although the second-language learners made omission errors compared to monolinguals, they produced more grammatical substitutions not found in monolingual acquisition, and they were more accurate for certain morphemes. Second, when she reviewed data from studies with simultaneous English–French speakers with language disorders, she found no differences in correct use of morphemes between bilingual children with language disorders and monolinguals with disorders. In these studies (Paradis et al. 2003; Paradis, Crago, and Genesee 2005) the comparisons involved eight bilingual French–English children with language disorders and 16 monolinguals with disorders (eight children in each language group). The findings of these studies showed no evidence that bilingualism causes additional delay.

These results are in contrast with the results of other studies, however. For example, a study conducted with five groups of Dutch and Turkish speakers in the Netherlands found that the Turkish bilingual group with language disorders had lower Dutch grammatical scores than Dutch monolinguals with disorders (Orgassa and Weerman 2008). However, using data previously collected in research with this population, Paradis (2010) demonstrated that these gaps in second-language acquisition are better explained by differences in the amount of exposure to the second language at a given point in time, not by the fact that these children were speaking a different home language. There is no evidence that children who are learning two languages take twice as long compared with children learning one language. In learning the second language, children apply universal language learning skills that they acquire from learning their home language. In other words, the findings of the available studies suggest that in second-language acquisition the two languages interact; the second language is not learned in isolation or separately from the first language.

Children with Autism Spectrum Disorders

Speech and language delays and communication difficulties are characteristics of ASDs, so professionals may recommend the use of the dominant language (typically, English in the United

States) as the language of intervention when families speak another home language (Jegatheesan 2011; Hambly and Fombonne 2012). Given the alarming prevalence of ASDs, there is increasing research on young children with these disorders (Autism Speaks 2012; U.S. Government Accountability Office 2006), including children in bilingual environments. Available research on DLLs with autism is exploratory and limited to qualitative studies, ethnographic studies, case studies, and a few comparative studies with small samples of convenience. However, research conducted in the United States and Canada includes a variety of home languages and English and children with a range of severity of ASDs.

Seung, Elder, and Siddiqi (2006) described the language development in Korean and English of a preschooler with autism who lived in Florida. The family's first language was Korean, and both parents were fluent in English. The child attended a preschool where he was exposed to English and the parents requested a bilingual speech and language therapist. During two years of speech and language therapy, the child's home language, Korean, was used in the first 12 months of intervention. In addition, the parents were also trained in strategies to facilitate the child's language development. As the child made progress producing Korean words, intervention in English was introduced at the single-word level and in two-word combinations. After this child started to produce two-word combinations in Korean, his English production of single words emerged. The final six months of therapy focused mainly on English. The child's language development was assessed at six-month intervals, through standardized tests, for up to 24 months of treatment. Because these tests have not been standardized in Korean, items were presented first in English and then in Korean if the child did not respond. Across the two years, this child demonstrated increased language development in both English and Korean.

Peterson, Marinova-Todd, and Mirenda (2012) examined the language development of 14 bilingual (English and Chinese) preschoolers with ASDs (mean age 59 months) and 14 English monolingual preschoolers with ASDs. The children and families lived in a large city in Canada. Children were assessed on English-language measures and versions of the tests standardized on typically developing Mandarin- and Cantonese-speaking children. Findings revealed no significant difference in language scores of expressive vocabulary or vocabulary comprehension of these two groups. When nonverbal intelligence quotient (IQ) was controlled, bilingual children had larger production vocabularies and equivalent conceptual vocabulary and size of English vocabulary compared with chronological age–matched monolingual children with ASDs.

Furthermore, scores in English tended to be higher than those in Chinese. These bilingual children were exposed to Chinese and English before three years of age and had a vocabulary of 30 words or more. Chinese was the primary language used in the home, and English was used in the community, including in speech therapy and behavior therapy. For these children, speaking Chinese at home and English at school did not have a negative impact on their language development.

In another Canadian study, Ohashi and colleagues (2012) compared a group of 20 children with ASDs (ages 24–52 months) who were exposed to two languages with 40 children in monolingual environments matched on chronological age and nonverbal IQ score. There was a wide range in level of parents' education and household income. Children in bilingual environments were exposed to a variety of languages, including Japanese, Urdu, French, and Spanish. No differences were found on age of first words or phrases, severity of autism-related communication impairments, receptive or expressive language, or functional communication skills.

Wharton and others (2000) used a case-study approach to examine the social and language development of three preschoolers with ASDs whose parents had immigrated to the United States. The families spoke Spanish, Russian, French, and Danish at home. Information was gathered through observations and conversational interviews with parents. Findings revealed an increase in children's linguistic competence and emotional attachment when parents used their home language. Children were more likely to imitate sounds and words in the home language than in English. The researchers found that when parents used their home language, they were more spontaneous, animated, nurturing, and natural in their interactions and provided more extensive language. For example, parents reported that compared with using English, when they communicated in their home language with their children, they were more animated when singing children's songs; used more facial expressions, gestures, and "silly talk"; and felt more relaxed and closer to their children. In contrast, those parents seemed less comfortable when they used English, because having to stop and think about the English vocabulary created tension, and their gestures were less spontaneous or rhythmic.

Hambly and Fombonne (2012) investigated the influence of bilingual environments on the language development of 45 Canadian young children (mean age 57.5 months) with ASDs compared with 30 children (mean age 53.9 months) with ASDs in monolingual homes. Bilingual

exposure was to French and English and trilingual exposure to French, English, and a minority language. Seven children had fewer than 10 words, and two were nonverbal. Some bilingual families stopped speaking two languages or reduced their use of three languages to two when their child was diagnosed. Children were divided into *simultaneous bilinguals* (exposed to two languages during the first 25 months of life) and *sequential bilinguals* (exposed to one language for the first 31 months of life). Compared with children with ASDs in monolingual environments, no significant differences were found on any language variables, expressive or receptive measures, or early language milestones data. Similarly, no differences were found between the simultaneous or sequential bilingual groups; therefore, the timing of bilingual exposure from infancy or later was not associated with language outcomes for the dominant language.

Jegatheesan (2011) examined the beliefs of three Muslim south Asian immigrant families in the United States regarding the language acquisition of their children (mean age 5.5 years) with ASDs. Families' socioeconomic status ranged from low to middle. This ethnographic study involved parent interviews and 700 hours of participant observation in the home and community with the families. Several languages (Arabic, Bangla, Gujarati, Hindi, Katch, and Urdu) were spoken in these homes, including English. Two children were nonverbal, and the third used gestures and a few words in English and Urdu. Medical and educational professionals advised parents to use only English with their children. However, parents were committed to multilingualism because of family, social, and religious values. Over the 18-month study, the children developed their use of two or more languages. The child who initially used a few words in English and Urdu developed sentences in both languages and also prayed in Arabic. One of the nonverbal children began to communicate in sentences in three languages—English, Bangla, and Arabic, which was used for reciting prayers—and the other nonverbal child used 10–15 words in three different languages. Although this study did not examine language interventions, findings highlight the importance of considering family culture and values and identifying ways for the child to be included in the family and community. Findings also suggest that children with ASDs and severe language delay and cognitive delays can learn two or more languages.

In another ethnographic study, Kremer-Sadlik (2005) described the experiences of four families of elementary-aged children diagnosed with high-functioning autism. These families lived in the Los Angeles area. Parent interviews and video recordings of the children's interactions at home and at school were transcribed. Parents reported that when their children

had been diagnosed with ASDs as preschoolers, professionals advised them to speak only English with their children regardless of the family's home language (Chinese or Armenian) or English proficiency. As a result of following these recommendations, parents revealed that their children's interactions with family members and participation in family conversations decreased. According to Kremer-Sadlik, use of the home language provides the child with various social situations that support understanding of how to interact with others and what utterances communicate. In sum, these findings suggest that speaking the home language facilitates social interactions and, in turn, language and social development. On the other hand, limiting use of the home language may have negative influences on the social and language development of children with ASDs.

Children with Intellectual Disabilities

There are few studies on the dual language development of children with intellectual disabilities, and they focus on children with Down syndrome (DS). Professionals often recommend a monolingual language environment because of children's cognitive and language delays and difficulties (Buckley 2002). However, a comparison of the language abilities of eight bilingual Canadian children who had DS with 14 monolingual Canadian children who had DS found no significant differences on English-language measures (Kay-Raining Bird et al. 2005). Bilingual children were recruited from Montreal, and the monolingual children were recruited from Nova Scotia. These bilingual children (mean chronological age [CA] 85.5 months, mean mental age [MA] 35 months) had been exposed to a second language for at least 32 months, and their parents spoke English and either French or Cree at home and in the community. Findings suggest that children with DS can learn two languages and that the language development of bilingual children with DS in their dominant language will be similar to monolingual children with DS when matched for developmental level.

Another study in Canada by Feltmate and Kay Raining-Bird Bird (2008) analyzed the vocabulary skills of four bilingual children with DS (mean CA five to eight years; mean MA 30–48 months) and compared them individually with those of a typically developing bilingual child and a monolingual child with DS. Results indicated that the bilingual children with DS developed syntactically and semantically in both languages equally, although they also exhibited challenges, especially in expressive language skills in both languages. These findings suggest

that dual language learning does not affect the process of English-language acquisition of children with DS in English-dominant or balanced bilingual children.

Deaf Children with Cochlear Implants

In the United States, families of deaf children in oral programs (i.e., those that focus on listening and speech development in special education classes for children with hearing loss) are usually advised to adopt the language of intervention, which is English (Levi et al. 2008). However, although deafness limits access to spoken language, some U.S. studies have found that children with cochlear implants (CIs) have developed two spoken languages when the home language is different from the language used by teachers and therapists (Guiberson 2005; Levi et al. 2008; Thomas, El-Kashlan, and Zwolan 2008).

In a retrospective analysis, the language of 14 children with dual language exposure at home in California with a minimum of 18 months of CI experience was compared with that of 15 monolingual peers matched for communication mode (i.e., oral or total [sign and speech] communication), etiology (cause of hearing loss), and age at CI implantation. No significant differences were found on English speech perception or English receptive or expressive language measures. These findings suggest that practitioners should *not* recommend that families inhibit the use of their home language with their children with CIs (Levi et al. 2008).

Another study in the United States also reported similar findings in a comparison of children with CIs from bilingual homes with a variety of home languages and those from monolingual English-speaking homes (Thomas, El-Kashlan, and Zwolan 2008). No significant differences on English speech and language measures were found between 12 children with CIs from bilingual homes (languages included Arabic, Cantonese, French, Spanish, Marathi, and Gujarati) and 12 from monolingual homes. Those children were matched for age of implantation, educational setting, and type of CI.

Yim (2012) examined the language development of 20 profoundly deaf children (ages 49 to 106 months, average age 72.6 months) with CIs in bilingual homes (Spanish and English) in the United States. Children increased their English receptive and expressive scores and overall English semantic and syntactic scores with age and experience with the CI. Children who were exposed to more Spanish at home had higher Spanish-language skills. Communication mode (oral only or total communication with speech and signs) influenced the children's speech sound accuracy in English or Spanish.

Research on 18 profoundly deaf children with CIs in bilingual home environments in Australia also indicates that they developed age-appropriate receptive and expressive language in their primary language (most used English), although their skills in the second language used in their homes varied from early production to advanced fluency (Waltzman et al. 2003). Secondary home languages included Arabic, Armenian, French, German, Hebrew, Russian, Spanish, and Yiddish. Children in the study were implanted between one and five years of age, and length of usage ranged between 10 months and 12 years. They were assessed on a variety of receptive and expressive language measures for English and proficiency in the second language. Home environments and family preferences influenced the children's second-language learning. Children were exposed to English and a second language other than English at home (some children were exposed to English and two or more other languages at home). Fourteen children attended bilingual schools, and seven received language intervention in both English and the second home language. Several parents reported that when the child's hearing loss was diagnosed, they were advised to stop speaking the second language at home. However, once the child developed English skills after receiving the CI, they began to use both the second language and English at home.

Another study in Australia assessed the language skills of 12 prelingually and profoundly deaf children in bilingual homes who received implants before the age of 36 months were assessed at 12 months and 24 months after implantation (Robbins, Green, and Waltzman 2004). Children were assessed on their English-language skills and second-language proficiency. The majority demonstrated first-language skills (English) within the range of normal-hearing peers. Exposure to second language varied at school and in speech therapy. All parents were English speakers who spoke another language (Hebrew, French, Spanish, Arabic, German, Yiddish, or Armenian) at home. As in other studies, children's proficiency in two languages was related to language use at home and in the community and to the amount of time after implantation.

A single study in Germany has reported speech and language differences between deaf children with CIs in monolingual and bilingual home environments. Teschendorf and her colleagues (2011) found that German speech perception scores, as well as receptive and expressive German language scores, of 41 profoundly deaf children with CIs in monolingual homes were higher than those of 52 profoundly deaf children with CIs in bilingual homes. The average age at implantation was 38 months. Children's speech and language skills were assessed

in German before implementation and at six-month intervals after implementation for three years. Families spoke a variety of first languages (59 percent Turkish, 11 percent Polish or Arabic, 7 percent Kurdish, 4 percent Portuguese, and 25 percent Italian, Berber, Albanian, or Serbo-Croatian). However, the majority of bilingual parents indicated that German was the children's primary language because teachers and therapists spoke German, although there were differences in the frequency of home language use. Teschendorf and her colleagues suggest that the findings of other studies in the United States and Australia of children with CIs were positively influenced by the parents' proficiency in the dominant language (English), parental involvement with the child's program, and socioeconomic and educational status. These demographic differences should be examined in future studies and may have implications for parent training and also interventions with children.

Children with Language Disabilities Apply Their Home Language Skills When Learning English

In most cases, studies with DLLs examining the effectiveness of program approaches that include the home language in educational settings have focused on children with typical language development, not on children with disabilities. In addition, research that has addressed children with disabilities is based on monolingual children, not on DLLs. Very few studies directly assessed the effect of the language intervention with DLL children who had disabilities (for a recent review, see Thordardottir 2010). The available research on DLLs with disabilities varies in methodology, child characteristics, severity, and age. Yet the findings of these studies consistently indicate the positive benefits of using a bilingual intervention approach to facilitate their language development. For example, early research with five- and six-year-olds showed that Latino children made more gains in their learning of novel English words when these words were first introduced in the home language (Spanish) compared with when the words were directly presented in the second language (English) (Kiernan and Swisher 1990; Perozzi 1985; Perozzi and Sanchez 1992).

In a single case study focused on vocabulary, Thordardottir, Weismer, and Smith (1997) found significant improvements for both bilingual (Icelandic–English) and English-only interventions with a preschooler whose family had moved from Iceland to the United States. The language used in intervention appeared to have a different effect, depending on the outcome measures. The bilingual intervention appeared to facilitate growth for home vocabulary, but not

for school vocabulary. A different case study in England focused on one Punjabi–English child with phonological disorders and found that the English-only intervention induced improvements in the production of sounds of both languages, not just the language targeted for treatment (Holm and Dodd 1999). If target sounds are shared by the two languages, children can transfer skills from one language to the other as long as they have sufficient opportunities to learn in each language.

Current research with preschool Latino children with language disorders indicates that a bilingual intervention may induce a faster rate of acquisition of the second language—in particular, in children who have more severe language delays. In a recent randomized controlled trial (Gutiérrez-Clellen, Simon-Cereijido, and Sweet 2012), 188 Latino preschoolers with specific language impairment (SLI) and minimal or limited English skills were sampled from 60 preschool classrooms in 14 schools in Southern California and Arizona. The children participated in a small-group academic enrichment program for 12 weeks and were followed up for assessment three and five months after the intervention ended.

Children were pulled out from different classrooms to participate in the program provided by 11 project specialists specifically trained for this study. The academic enrichment activities were implemented four days per week for 45 minutes each day, in small groups of no more than four children, for a total of 12 weeks. The lessons included a range of hands-on, curriculum-based activities (e.g., picture sorting, manipulatives, storytelling) to facilitate vocabulary development and numeracy skills.

Half of the participating children were randomly assigned to either a balanced bilingual or an English-only program. In the English-only program, each session was conducted in English. In the balanced bilingual program, the teachers alternated the language of instruction each day. Each lesson was taught in Spanish followed by the same lesson taught in English on a consecutive day. The remaining two lessons alternated between the two languages in different order each week. The two language programs used the same books, materials, target vocabulary words, and activities. For example, in the English-only program and on "English days" of the bilingual program, teachers read *Little Red Riding Hood* and taught target vocabulary such as *forest* and *gather*. On the "Spanish days" of the bilingual program, the teachers read the Spanish version of the book (i.e., *La caperucita roja*) and taught the same target words in Spanish (e.g., *bosque*, *recoger*). Children who were taught in the English-only program did not alternate

languages each day and therefore received the same lesson twice. The selected books had Spanish versions that were deemed appropriate and were commercially available. Children were encouraged to use the language of the day, although they could respond in any language to demonstrate knowledge and skills. Teachers were trained to explain activities with simple phrases, to use slow speech rate and intonation when introducing vocabulary words, to recast (restate) what the child said throughout the lesson and request repetitions, to provide paralinguistic cues (e.g., gestures and pantomime), and to be encouraging and enthusiastic.

Before the intervention began, all children were assessed in both languages using experimental measures (e.g., sentence repetition, picture description) and spontaneous language samples. These measures did not come from the content of the instructional activities or curriculum because the goal was to evaluate the child's language growth. The severity of the children's language disabilities was established in Spanish (i.e., the child's home and dominant language). For the children with severe language disorders, the bilingual intervention was more beneficial than the English-only intervention; those children showed faster growth in English than their peers in the English-only program. This finding is in direct contrast to a recommendation that children who have severe language disabilities should receive interventions only in English. Children with severe delays *are* capable of learning two languages. In fact, they learn a second language faster when the intervention is provided in both languages compared with only in English.

The second factor that affected outcomes was the child's level of English vocabulary and use of the second language at the beginning of the program. Children with language disorders who have limited English development cannot be expected to show the same rate of growth in an English-only program as children who have higher English fluency. In the study, children who had limited English skills did not improve at the same rate in the English-only program as children who had higher English skills. Children appear to need a minimum level of English development in order to fully benefit from interventions provided only in that language.

The research summarized so far focuses on the factors that predict differences in English outcomes for children with language disorders and that could help in making decisions about which language to choose for intervention. The findings indicate the positive effects of a bilingual intervention approach for children who have limited English skills. In addition, based on these findings, a bilingual approach is recommended for children with severe disabilities.

Furthermore, the need to support the home language for these children is critical when one considers that for many children, the home language, and not English, is the only language in which the family can communicate. Interventions that are child- and family-centered require a language approach that is appropriate for the family and necessary for facilitating the child's communication at home.

Children with Language Disabilities Are at Greater Risk for Home Language Loss

Research with typically developing children has found that children who are not exposed to a rich language environment in the home language are likely to show limited growth and skills in that language. For example, Spanish-speaking children in the United States were found to have lower Spanish vocabulary scores than monolingual Spanish speakers from Latin American countries (Collins et al. 2009; Umbel et al. 1992). As children use more English, they may also start making grammatical errors in Spanish (Anderson 1999) because of limited exposure and use of the language (Anderson and Souto 2005). These patterns of Spanish "loss" have been observed in children with language disorders as well (Restrepo and Kruth 2000). Children with language disorders may not be able to maintain or develop their home language skills unless that language is specifically targeted in intervention.

Similar patterns were found in a recent longitudinal analysis (Simon-Cereijido, Gutiérrez-Clellen, and Sweet 2012) based on the outcomes of the previously discussed intervention study of preschool four-year-olds with language disorders (Gutiérrez-Clellen, Simon-Cereijido, and Sweet 2012). Specifically, children who had greater language delays were not able to maintain their rate of growth during the follow-up testing after the intervention ended. Those children appeared to be more vulnerable to loss of their home language than children with milder language impairments. The child's English use in the classroom also had a significant effect on the child's potential for growth in Spanish. The study found that as children used more English in the classroom, they made smaller gains in Spanish. It is important to note that children in the bilingual program received only 45 minutes of Spanish intervention twice a week. During the other two days, intervention was conducted in English. This amount of exposure and practice may not be sufficient to accelerate growth in the home language in children with language disorders. In sum, to help children communicate in their home language with their family members, they should receive bilingual interventions of greater intensity and duration.

Research on the Effect of Training Teachers and Parents

Bilingual teachers and/or bilingual teacher assistants can be recruited and trained to use the two languages in intervention. In a recent study (Gutiérrez-Clellen and Simon-Cereijido 2011), Head Start bilingual teachers were trained to provide bilingual interventions targeting Spanish and English vocabulary and oral language output in the context of the classroom. Using developmentally appropriate bilingual books and materials each day, the teachers taught the vocabulary in large-group activities and focused on oral language and concepts in small groups during the nine-week study period. The teachers received two days of training before implementing the intervention and were shadowed by their teacher mentor during the first week of the intervention. A total sample of 157 Spanish-speaking preschoolers who were DLLs participated in the program. The mean age was 4.4 years with a standard deviation of 3.61 months. The children's Spanish- and English-language abilities were evaluated to determine which children exhibited typical language development (TLD) or primary language impairment (PLI). Children were assigned to one of two groups: (a) children who received the intervention (34 children with TLD and 40 children with PLI); and (b) children who did not receive the intervention (49 children with TLD and 34 children with PLI). The interventions were provided above and beyond any other available speech and language services.

The performance of the children was assessed by vocabulary and oral language measures in the two languages. Outcomes were collected at pre-intervention, post-intervention, and two follow-ups. The results of this research indicate that those children who received the intervention had a faster rate of growth in both languages compared with the children who received the standard curriculum. The study shows that teachers are capable of implementing a language intervention program to children with language disabilities in the context of the classroom and the curriculum.

Teachers who are monolingual can also implement a bilingual intervention in collaboration with the family. In Canada, Tsybina and Eriks-Brophy (2010) evaluated the feasibility of a bilingual dialogic book-reading intervention for preschoolers with expressive vocabulary delays. There were six children in the experimental group and six children in a delayed treatment control group. Their ages ranged from 22 to 41 months. The children received 30 sessions, each one lasting 15 minutes, in each language (Spanish and English) for six weeks in their homes. The mothers were trained to use dialogic book-reading strategies in Spanish. A list of the target

words and the books were given to the mothers on a weekly basis. The experimenter delivered the same interventions in English on separate days. Results show that the children in the intervention group learned significantly more target words in each language following the intervention and at a follow-up test than the children in the control group. The mothers in the study were able to use the language strategies and help their children learn the target words in the home language.

Implications for Practice

Studies examined in this review suggest that speaking one language at home and English at school does not produce language delays or difficulties among children with a range of special needs. Moreover, this research indicates that a bilingual intervention approach actually facilitates these children's language development. Furthermore, available studies indicate that even children with ASDs who are nonverbal can learn two or more languages. There does not appear to be any evidence base for limiting exposure to a single language when children have disabilities. Teachers and other practitioners should be trained to facilitate the language development of all young DLLs, including those with special needs. This is an important area for professional development. There is also a critical need to recruit and train bilingual teachers and speech–language pathologists. In addition, an interdisciplinary team approach (i.e., a team of teachers and specialists related to the child's learning needs) is required to address the complexity of facilitating the language development of young DLLs with disabilities and to provide coordinated and comprehensive intervention.

Research indicates that many families of preschoolers with special needs value home language maintenance and bilingualism for their children. Given the significance of the culture of a family, parent–child interactions, a child's sense of identity and belonging, and the parents' sense of competence and confidence, families should be encouraged to maintain their home languages with their children. Further, if interventions are truly child- and family-centered, then they should promote the family's home language to facilitate the child's communication with the family and overall language development. Programs and practitioners working with DLLs who have special needs should also involve families in their children's learning experiences and provide them with parent education opportunities.

Families would benefit from home visits, coaching, and modeling to learn strategies that will promote their children's language development. For example, training could include using

interactive storybook reading, such as dialogic reading, and other strategies to expand the child's vocabulary and engage the child in conversation. All preschoolers benefit from responsive and enriched language environments; however, these positive interactions and important language experiences are even more critical when young children have special learning needs.

Conclusion

As identified throughout this review, the current research base on the bilingual development of children with special needs is somewhat limited. Research on the bilingual development of children with autism, intellectual disabilities, and deaf children with CIs has focused primarily on whether these children can learn more than one language and whether the maintenance of a home language will have a negative impact on the development of the language of instruction. Given the nature of the children's disabilities, those studies had small sample sizes and used nonexperimental descriptive designs (e.g., case, retrospective, ethnographic, comparative, and correlational studies). There is great variability in the implementation of a language intervention with those children and in the way in which outcomes are determined. Given these limitations, findings must be interpreted with caution and cannot be generalized to other populations or situations. Many questions need to be addressed in future research, including whether specific language pairings may have different language outcomes because some have similar syntactic and semantic structures while others do not. However, it is most noteworthy that emerging research suggests that children with a wide range of abilities and language difficulties can learn more than one language. This is a significant message to share with practitioners and families of young DLLs with special needs.

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