

Childhood Bilingualism: Current Status and Future Directions

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Workshop Summary

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Executive Summary

Forty-three percent of teachers in America's public schools teach non-English-speaking or English language-learning children. Dual language learners constitute a sizeable and growing proportion of the U.S. population. A distinct feature of the U.S. situation is the conjunction of bilingualism and poverty that is not as commonly the case in other countries. In the U.S. sociocultural context, a substantial proportion of children acquiring English happen to be poor and likely are enrolled in schools where resources are highly constrained, thus adding to the challenges of instruction and compromising effective learning and literacy. American schools increasingly are reflective of the multilingual world and in need of the best tools available to ensure that every child can succeed. Answers must come quickly to benefit this generation of children.

Given this sense of urgency, the Office of English Language Acquisition, the Office of Special Education and Rehabilitation Services, and the National Institute of Child Health and Human Development, National Institutes of Health, with support from the American Federation of Teachers, the International Reading Association, and the American Speech-Language-Hearing Association, convened a workshop on April 22–23, 2004, in Washington, DC, on Childhood Bilingualism: Current Status and Future Directions. The workshop capitalized on the increasing convergence of interest in theoretical underpinnings of language development with the translation of research findings for the practical benefit of children.

Primary purposes of the workshop were to initiate an open and ongoing discussion among key members of the research community, as well as across disciplines and research approaches, and across national boundaries, and to develop a research agenda that outlines major research questions, re-energizes research, and promotes the development of novel, creative approaches or approaches not seen traditionally in the area of bilingual language development. Opportunities to connect applied researchers and more theoretically inclined academic researchers to promote collaborations and increased communication were of particular interest. Participants were given the mandate to consider a research agenda for the field, not just for one agency. Therefore, participants were encouraged to make recommendations for future research that would cross traditional agency boundaries and most rapidly and effectively move the field forward. In this mandate, federal sponsors recognized that research needs are not necessarily program focused but would need to investigate basic questions such as how the brain acquires language, as well as more practical ones, and that even the most basic research should have eventual practical applications. The workshop began with presentations on the current state of the field, which set the stage for breakout groups to develop research questions, approaches, and priorities.

Current Status of Research on Childhood Bilingualism

Researchers of language acquisition have tended to focus their efforts on questions like how the process of language learning differs for bilinguals and monolinguals. The debate over bilingualism has been framed too often in terms of its potentially damaging effect upon children's educational outcomes. To be sure, learning a second language takes time, and initially there may be cognitive costs in terms of response time and depth of knowledge. In comparison to monolingualism, bilingualism can manifest initially as lower oral proficiency and slow vocabulary development in one or both languages; such effects can be apparent at 18 to 24 months of age. These limitations on vocabulary development, if they persist, can compromise

critical skills that are needed for successful reading; detailed studies of how and why such limitations may occur are highly important. However, over the educational lifetime of a child, such disparities seem to disappear.

Any adverse impact of bilingualism certainly must be balanced against potential benefits. Some studies indicate that bilinguals demonstrate a clear advantage in cognitive and conceptual processing, as well as in controlled attention skills. The ability of bilinguals to think in more than one language raises interesting conceptual questions about whether bilingualism actually promotes added mental flexibility and creates a deeper reservoir of intellectual “capacity.” Other data seem to suggest that the more practice individuals have with disparate or varied experiences, the faster they will learn. It may be that bilinguals effectively increase their breadth of stimuli and in the process become better at learning languages.

Neuroscience approaches provide intriguing neuroimaging data that suggest that the brains of early bilinguals may differ from those of monolinguals. Although a great deal of caution should be used in interpreting the limited results to date, one may speculate that, in fact, early bilinguals may have different access to executive function compared to monolinguals. In recent years, mainstream cognitive psychologists and neuropsychologists have shown greater interest in adult psycholinguistics and have recognized that the study of bilingualism offers the potential for profound insight into questions about cognitive processes as well as the nature of cognitive architecture and its consequences.

Given these relatively recent findings, it was not surprising that a number of workshop participants began with the assumption that having command of more than one language is an asset; its value may be sociocultural, economic, political, metalinguistic, or cognitive. If the assumption of bilingualism as an asset is true, then literacy and oral proficiency outcomes of bilingualism need to be assessed relative to both languages, not just English. The next interesting question then may be to determine what accounts for individual differences in bilingual achievement among bilingual children.

There is a surprising degree of consensus at some level in the empirical evidence.

- Bilingual children appear to acquire two language systems virtually from the beginning of the preverbal stage.
- Bilingual language acquisition is like that of a monolingual for the most part. At the same time, it also is evident that there is cross-linguistic transfer of morpho-syntax, albeit restricted in scope and duration.
- Bilingual and monolingual children exhibit similarities in terms of language discrimination and word segmentation, but bilinguals may encounter more delays in speech perception.
- The use of code mixing distinguishes bilingual children from monolingual children and is thought to be salient in understanding formal and functional properties of language acquisition. It also supports the idea that bilinguals adopt two language systems and have the capacity to acquire and access two grammatical systems simultaneously.
- When age is controlled, children who are faster and more accurate in speech processing also have greater vocabularies.

Only in the 1980s and 1990s did researchers begin to connect linguistic questions and cognitive development. A major point of discussion concerned how emerging language development maps

onto conceptual development and comprehension. Existing evidence suggests that both are moving targets, gaining greater linguistic and conceptual sophistication over time.

It was noted that languages vary not only in their sound patterns, but also in the cultural and social context in which they are used, in the ways these forms are recruited to convey meaning, and in the relative salience of grammatical forms. Although there is some knowledge about the structure of various languages and early conceptual development, it is not clear how the first language (L1) influences the second language (L2) and how L2 may affect continued L1 development. There are likely some advantages and some impediments. Among the effects to consider are age, in particular how and when L2 gets reinforced; whether L1 helps or impedes L2 development; and whether the different ways that languages can carve up perceiving and understanding the world pose a problem or an enriched exposure for a child.

Future Directions

There remains a need for basic research in areas of bilingualism that focuses on cross-linguistic fluency, processing, vocabulary, neuroimaging, effects of age and proficiency, and competence versus performance. Workshop participants identified many common themes and offered a number of suggested avenues to pursue.

Descriptive Research on Bilingualism

A clear and workable description of bilingualism is needed both in its social and cultural contexts (including input), as well as in its cognitive and linguistic aspects to understand learner groups and to map out and understand variations. Identifying where bilinguals' learning profiles differ from those of monolinguals would help to address the needs of bilingual children to become successful learners and literate in both languages.

It is important to understand these differences if we are to improve efficiency of instruction. For example, there may be different optimal instructional approaches depending on whether a child arrives in this country as a 6-year-old from Russia and is adopted into a monolingual family or if a child arrives as a fifth or sixth grader from China having learned to read and write in L1 and had continued family language support for L1 while learning L2. There are descriptive differences between monolinguals and bilinguals that certainly need to be identified; however, the perspective often is to treat monolinguals as the reference group. Although theoretically interesting, the comparison between monolinguals and bilinguals may not always be the appropriate comparison.

Change Across the Lifespan

There is a continued need to look at processes of change across the lifespan, not just during very early development. Basic developmental work on language attrition in bilingual children, children with true communication disorders, and children who have trouble learning language from the outset is sorely lacking and should be given greater attention.

Large-scale and longitudinal studies on language development during middle school and high school (including those of immigrant students who arrive in the United States in high school) are greatly needed, as there is extremely little research on these age groups. In particular, there is a need to include links between oral language development and academic achievement—the kinds of language skills being developed and what kinds are needed. Parent-child and peer interactions

and their influence on literacy are also important, as is the issue of how these interactions are themselves affected by language and literacy. In addition, a lifespan approach must include continued examination of bilingualism in adulthood and aging, with attention to its effects on proficiency in both languages and its potential impact on cognitive skills.

Instrumentation

The development of formal, standardized assessment tools with good technical qualities is a high priority for both L1 and L2, especially for L2 English. In particular, better assessments are needed for measuring language proficiency, vocabulary, phonology, syntax, pragmatics, and general language ability, and in ways that are sensitive to development. In addition, better measures of language and reading comprehension are needed. Mechanisms for sharing instruments across laboratories must be developed so that data can be compared and/or pooled and so that norms may be established.

Environments That Enhance Development

Research is needed to better understand the role of environment and culture in language and literacy development, and how issues of identity, classroom environment, and home environment promote success. Developing interventions that enhance the development of language and literacy will require research on instruction, teaching strategies, and teacher characteristics. There are few studies that address effective instructional interventions. On the educational side, the multilingual classroom challenges instructors in the context of multiple minority language backgrounds, where the language of instruction is not the native language of the majority of the students, and the students do not share a common native language.

Collaborations

Researchers in the field of childhood bilingualism must enlist partners in related disciplines, such as cognitive psychologists, educators, and sociolinguists, as well as social psychologists who study interrelationships and identity formation, and intervention researchers who can articulate theory and apply innovative methodological approaches. More international collaborations are needed to allow the examination of a wider variety of language pairs or combinations and of bilingualism operating in a wider variety of contexts. Collaborations that result in parallel research networks and larger sample sizes can be highly efficient and facilitative of the sharing of ideas and resources.

Research and Training Support

Participants recognized the need for both in-depth case studies and larger experimental studies. Funding approaches are needed that will support combining smaller-scale, focused studies with a big science approach, as well as piggybacking on projects and using postdoctoral training grants to give new entrants opportunities to excel.

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Childhood Bilingualism: Current Status and Future Directions

Washington, DC
April 22–23, 2004

Introduction

Many children in the United States grow up exposed to more than one language. For these children, environmental bilingualism and multilingualism have not been well described. Much of the existing research has focused on documenting whether bilingualism is beneficial or harmful for particular cognitive, linguistic, and educational outcomes. A broader approach is needed in which environmental bilingualism is explored fully as one aspect of the ecology of human development with potential consequences for oral language development, literacy, academic achievement, and social adaptation. Research is needed to document the forms that environmental bilingualism takes, the relations between parameters of environmental bilingualism and child outcomes, and the processes by which environmental bilingualism shapes children's development. Assessment to document children's development in these areas and to measure language input and various aspects of the environments that provide language input will also be crucial; thus, measurement tools and approaches must be part of any discussion.

Within this context, a meeting on Childhood Bilingualism: Current Status and Future Directions was convened April 22–23, 2004, in Washington, DC, that capitalized on the increasing convergence of interest in theoretical underpinnings of language development, as well as the translation of research findings for the practical benefit of children. Sponsored by the Office of English Language Acquisition (OELA), the Office of Special Education and Rehabilitation Services, and the National Institute of Child Health and Human Development (NICHD), National Institutes of Health, and with support from the American Federation of Teachers, the International Reading Association, and the American Speech-Language-Hearing Association, this workshop was envisioned as the first step in the development of a research agenda that all federal partners and associations could embrace.

The workshop had two major goals:

- To initiate an open and ongoing discussion among key members of the research community, across disciplines and research approaches, in order to re-energize research and promote the development of novel, creative approaches or the application of approaches not applied traditionally to the area of bilingual language development.
- To develop a research agenda that outlines major gaps and research needs in the area of bilingual language development, to formulate major research questions that must be addressed to move the field forward, and to indicate priorities or a logical sequence for those research questions.

The design of effective programs that encourage bilingualism and biliteracy can benefit from prior research and depends on sound future research. The multiple federal sponsors recognized that this research may investigate either applied or basic questions, such as how the brain acquires language; it is anticipated that even such basic neurobiological studies ultimately will translate to knowledge that benefits children via direct applications. The workshop began with

presentations of current work on bilingual language acquisition, including infant studies of language acquisition and studies of school-age bilingual and English-language learner (ELL) language development, to set the stage for breakout groups to develop research questions, approaches, and priorities. The convening of this workshop underscores the sponsoring agencies' interest and commitment to supporting an area of research that is considered to be deserving of greater attention. The mandate was to consider a research agenda for the field, not just for one agency. Therefore, recommendations for future research were permitted to cross agency as well as national boundaries.

Setting the Stage: Current Work on Bilingual Language Acquisition

Cognitive and linguistic aspects of child bilingualism include understanding how the acquisition of two or more languages affects the rate and course of development in each language.

The Social Circumstances of Bilingualism: The Miami Experience

Rebecca Eilers, University of Maine

Dr. Rebecca Eilers reported on research that she and co-investigator, Dr. Kimbrough Oller, conducted with colleagues on the language and literacy development of bilingual children in Miami, all of whom were born in the United States. She began by observing that multilingualism is a global reality; the monolingualism seen in the United States is an anomaly. Despite being monolingual in a multilingual world, Americans resist becoming bilingual in part because English is so politically and socially powerful that it is fast becoming the world's *lingua franca*, and in part because the United States seems to have a deep fear of balkanization by other native tongues. In particular, some seem to fear that English will be overtaken by Spanish. Additionally, the debate over bilingualism often is framed in terms of its potentially damaging effect upon children's educational outcomes.

To explore “anecdotally-inspired [sic] fears that bilingualism and bilingual education are inherently damaging to children” (Oller and Eilers, 2002, p. 21), Eilers and Oller applied statistically sophisticated analytical techniques to determine whether bilingualism in the context of English only or bilingual education, in and of itself, causes intellectual or educational harm and how to isolate and assess effects of bilingualism appropriately. They selected Miami because it has a single, unified school district that uses multiple strategies for language learning—both one-way (English immersion) and two-way (½ day English, ½ day Spanish) schools. Children studied in both the two-way and English immersion programs were all bilingual; half had English and Spanish at home; half had only Spanish at home. The schools were matched carefully to be comparable on proportions of students who were Hispanic and had limited English proficiency; schools also were matched on math achievement scores and student per capita expenditures. Bilingual children in the two-way and English immersion schools were matched with a group of monolingual children selected from schools with demographics similar to those of the bilingual children.

In addition, Miami has a large number of established, well-integrated, Spanish-speaking and bilingual families with high socioeconomic status (SES). Unlike most other places in the United

States, in Miami the Spanish language is associated with power: politicians are Hispanic¹, commerce is conducted bilingually, and only Spanish is spoken in some areas of the city. Therefore, the research design allowed them to incorporate school instructional methods, SES, and the effect of language spoken at home as variables, thus emphasizing both classroom and home environments. The core design was replicated at the kindergarten, second grade, and fifth grade levels.

Eilers described some of the traditional origins of bilingualism. Early bilinguals generally come from homes where two languages are spoken—either because each parent speaks a different native tongue or because both parents are fluent bilingually. Late bilinguals gain their language facility through school or cultural exposure; most of these individuals have a home language that is not English, although some of them have English-speaking parents who introduced them to a second language as well.

The study examined the effects of SES on bilingualism. Parents designated as low SES tended to be working-class immigrants who reported having relatively low English proficiency and considered their children’s mastery of English as a way up the social ladder. Although parents with higher SES tended to expose their children more effectively to bilingualism, approximately half of them chose *not* to speak English at home. The families with higher SES often fostered the use of Spanish at home as a way of maintaining their Hispanic culture and heritage.

Eilers’ and Oller’s study hypotheses revolved around the possible interdependence between the second language (L2, English) and the first language (L1, Spanish) and the idea that a strong foundation in L1 supports the learning of L2. The researchers hoped to determine whether bilingual children’s acquisition of English was additive or subtractive. Additive bilingualism refers to situations in which the learning of a second language occurs with no loss to the first language. Subtractive bilingualism refers to situations in which the learning of the second language reflects the loss or poor learning of the first language.

While they found some evidence for additive bilingualism, especially vis a vis literacy (less so for oral language), Eilers reported evidence of subtractive bilingualism in only the earliest grades. Researchers initially thought that children who came from families with high SES, were exposed to both English and Spanish at home, and then attended two-way immersion schools, would be most advantaged but they found no evidence to support this hypothesis. Results suggest that learning to read one language assists in learning to read the other. Oral language skills seem to be learned relatively independently across two languages, and no major inhibitory effects were found.

One distinctive feature of this study was the “Talk of the School” research, which examined the language used by teacher-to-class, teacher-to-student, student-to-teacher, and student-to-student. Eilers reported that students and teachers did speak the designated language with some opposite-language intrusion at the youngest ages. However, when speaking privately, students tended to address each other in English. Outside of the home and classroom, a bilingual child’s language choice shifted toward English with his or her peers—even in two-way bilingual school settings

¹ “Hispanic” includes all national origins of Spanish speakers including Cubans, Mexicans, and Central and South Americans.

and even when peers were bilingual. Even at the youngest ages (beginning in kindergarten), child-to-child commerce was executed largely in English. This pattern continued into high school. Bilingual college students at the University of Miami reported that even if they arrived in the United States as teenagers and had Spanish-speaking peers, they conversed with friends in English approximately 50 percent of the time. The choice of language use depended on the activity—while children opted to speak English to their friends, they often spoke Spanish in church or when having family or community meals.

Researchers began this study with the assumption that having command of more than one language is an asset; its value may be sociocultural, economic, political, metalinguistic, or cognitive. Given this assumption, Eilers emphasized that literacy and oral proficiency outcomes of bilingualism need to be assessed relative to both languages, not just English. Language tests to assess vocabulary knowledge by bilinguals may be misleading because both languages are not typically tested, resulting in a failure to capture different domains of knowledge that children possess in different languages.

Children who are exposed more consistently to a language showed advantages in acquisition, so the best speakers of English were monolinguals, followed by English immersion bilinguals and two-way bilinguals; within this latter group, those speaking English and Spanish at home did better in English than those only speaking Spanish at home. This advantage of English immersion over two-way schooling, seen mainly in kindergarten and second grade, largely disappeared by fifth grade, suggesting that a critical mass of language experience had been acquired by all groups. In contrast to English attainment, differences in Spanish attainment increased by grade level with two-way education, with the greatest differences at fifth grade. The magnitude of the differences favoring two-way education for Spanish was larger and more consistent than that favoring English immersion for English.

In conclusion, Eilers acknowledged that real costs are associated with bilingualism. Learning a second language takes time, and there may be several cognitive costs in terms of response time and depth of knowledge; however, these costs must be weighed against potential benefits. Over the educational lifetime of a child, costs are minimal and seem to disappear by fifth grade for English learning.

Even in Miami, English performance was generally better than Spanish on all kinds of tests, even for children whose parents spoke only Spanish at home. Given the choice, Hispanic children preferred to speak English regardless of age or language background at home. The data suggest that linguistic assimilation to English is active and profound in Miami while Spanish is supported primarily by new immigration. Two-way education can help maintain skills in Spanish, especially by building literacy, with little or no cost when compared to English immersion.

Bilingual First Language Acquisition in Perspective

Fred Genesee, McGill University

Dr. Fred Genesee provided an overview of the body of research focused on bilingual first language acquisition (BFLA) and the landscape of “dual language learning,” a more neutral term used to describe the acquisition of an additional language by children or adults. He distinguished between children learning two languages simultaneously (i.e., bilingual first language) and those learning a second language (e.g., ELLS), an important distinction that often is not made in the

education literature. This distinction is also important from theoretical and applied perspectives in order to have a clear understanding of who the language learners are and to distinguish between the majority and minority languages being learned (Genesee, Paradis & Crago, 2004).

Genesee outlined five broad issues that shape the context or landscape of this research area and then highlighted some of the key findings in each of these domains:

1. A fundamental issue is whether children who acquire two languages simultaneously acquire one language system or two. It has been thought that learners go from a stage of being monolingual (one language system) to being bilingual (two language systems). What is the nature of the underlying macro systems for this transformation from monolingual to bilingual representation, or does it start out as bilingual representation? Are there cross linkages or something in between?
2. Another issue is the pattern of language development for each language acquired in terms of phonology, morpho-syntax, lexicon, and functional competence. For example, does the bilingual child's pattern of language acquisition resemble that of the monolingual child? If it does not, is the difference meaningful? If there are cross-linguistic interactions, in what domains do they occur and what are the mechanisms that account for them?
3. A third focus of investigation has been on bilingual code mixing (BCM). As bilingual children do this, it sets them apart from monolingual children and, therefore, is thought to be highly salient in understanding formal and functional properties. Formal properties refer to structural constraints such as whether code mixing is random or related to syntactic development.
4. Functional competence of bilingual children (e.g., whether bilingual children have a different repertoire of skills and are fundamentally different from monolingual children in their communication approaches) has been another focus of research.
5. An emerging area of research is the preverbal stage of speech and language processing and production in bilingual children.

There is a surprising degree of consensus at some level in the available empirical evidence. Focusing on verbal learning, Genesee concluded based on his reading of the literature that bilingual children can acquire two language systems virtually from the beginning of the verbal stage. He based this conclusion on evidence of functional competence, morpho-syntactic development, to some extent lexical development, and possibly phonological development, the latter two of which have been less researched.

With respect to patterns of development, a number of trends have emerged. Bilingual acquisition is like monolingual acquisition for the most part. At the same time, it is also evident that there is cross-linguistic transfer of morpho-syntax, albeit restricted in scope and duration. Such transfer is attributed to at least three kinds of factors: (1) internal linguistic or structural factors (Hulk and Muller, 2000); (2) cognitive processing (Dopke, 2000); and (3) dominance in one language (Yip & Matthews, 2000; Paradis, 2001). A major issue is that transfer is not universal to all language pairs or all learners in a given pair (e.g., no evidence of transfer between French and English). Evidence concerning rate of development is inconclusive due to limited data, but there is no evidence of systematic acceleration or delay.

In terms of BCM, child BCM is grammatically constrained and not random. Constraints may be operational from the outset and appear to resemble those for adults. The latter is somewhat

controversial and inconclusive, requiring further research; there is also no consensus about constraints for adults. Multiple factors are thought to underlie child BCM, for example the child's competence in two languages and the nature of the input. BCM results support the idea that bilinguals adopt two language systems and attest to the capacity of children to acquire and access two grammatical systems simultaneously.

Findings on functional competence suggest that children in the one- or two-word stage (from 2 years of age onward) who are learning two languages simultaneously exhibit differentiated and appropriate use of both languages (constrained by proficiency in each language) and appropriate repair strategies in response to feedback concerning appropriateness of language choice. Patterns of repairs in response to requests for clarification are common to monolingual and bilingual communication. Dual learners show sensitivity to rates of code mixing in input and language socialization effects with respect to code mixing "norms."

Research on speech and language processing and production during preverbal stages reveals similarities between bilinguals and monolinguals in terms of language discrimination (Bosch & Sebastián-Gallés, 2001) and word segmentation (Polka & Sundara, 2003). However, speech perception for bilinguals has been found to lag behind that of monolinguals (Fennel & Werker, 2003).

In discussing future directions, Genesee stated that more research generally is needed in the second through fourth domains. In particular, more attention should be focused on BFLA from 3 years of age. More research is needed on young L2 learners, starting as young as 12 months of age and continuing through school-starting age, and with adopted children beginning with their oral language development as ELLS. There is extremely little research in this area despite its importance for managing effective language learning among children. It is potentially interesting to examine similarities and differences among monolinguals, simultaneous bilinguals, and older L2 learners, the meaning behind these differences, and the links to literacy and learning. Additional research also is needed on particular sociocultural influences on BFLA:

- Are acquisition patterns influenced by sociocultural factors?
- Are there minority language situations that alter these patterns, in what ways, how, and why?
- Does code mixing in communities with extensive code mixing give rise to differentiated systems or not?
- How does minority status influence language use in the home and ultimately children's acquisition?

Large-sample, longitudinal studies are needed involving 20 or 30 families that are followed for at least 5 to 6 years to map out variation in BFLA and factors that may account for it. Such normative data would provide information on the minimal conditions necessary for "full" bilingual proficiency and the conditions that result in truncated proficiency. Of particular interest is whether BFLA and monolingual children with language impairment and other challenges can be distinguished from second language learners in terms of patterns and rates of language development, and ultimate levels of proficiency.

Discussant Comments

Marilyn Vihman, University of Wales

Dr. Marilyn Vihman presented preliminary results of psycholinguistic research on the preverbal infancy period. In the first year, infant “knowledge” can be identified through experiments that reveal preferential attention to patterns familiar from experience with the native language (Vihman, 1996; Jusczyk, 1997). This is implicit knowledge, an unconscious sense of, and tally of, the patterns of the native language(s). Implicit knowledge is the product of a learning process that is well underway already in the first year as children absorb patterns of language and sound. This prelinguistic implicit learning of ambient language patterning is both perceptual (taking in the sound of the ambient language [s]) and proprioceptive (taking in the “feel” of vocal patterns that yield ambient language-like effects, i.e., favoring sounds that are similar to what has been heard). This explains the finding that despite similarities in vowel sounds in English, French, Cantonese, and Arabic, children are biased toward vowel sounds most frequently encountered in their native language. As early as 10 months of age, children favor or repeat sounds they hear more often. Implicit learning should be distinguished from the explicit learning of the sound and meaning of specific words and phrases seen from early in the second year of a child’s life when children start to produce words and express relationships on demand, representing learning at a new level.

Focusing on how bilingual learning affects the onset of word recognition, the first step in explicit language learning, Vihman presented her current study of 24 bilingual English-Welsh infants at 11 months and monolinguals in each language at 9, 10, 11, and 12 months, reporting preliminary results from the bilinguals and from the monolinguals at 9 and 11 months. The study employs repeated cross sections using two parallel experimental paradigms to test infant word recognition:

1. “Head Turn” (HT), a behavioral method; and
2. Event-Related Potentials (ERP), a recording of brain responses from the surface of an infant’s scalp.

A critical factor in testing for word recognition is to oppose common words—apple, naughty, bottle, nappy, thank you—to similarly structured uncommon words that are highly unlikely to be used with infants—Eiffel, courtly, nettle, wacky, juncture. Vihman noted that her experiments involved no specific word training or familiarization but are based on what children likely are to bring with them to the experiment from home. Different cross sections were used to minimize learning effects.

Tasks examined using the HT paradigm showed that at 11 months bilinguals are not yet showing significantly longer looking times to familiar words compared to monolingual English-speaking infants, but they look longer to English words overall ($p = .03$). Parental reports of English and Welsh words understood in the child’s total vocabulary generally correlate with looking times to familiar words in each language ($r = .54$, $p < .05$). That is, children with high English vocabularies looked longer at familiar words in English; children with high Welsh vocabularies (of which her sample had only two) looked longer at Welsh words; and there is a correlation between relative amount of English vocabulary and looking times. English appears to be “leaking in” from the community.

ERP studies based on 13 children revealed at 11 months what appears to be a significant effect of “word type” in the tracings, that is, there was greater mismatch negativity to familiar word forms ($p < .03$). ERP show that babies are responding to familiar words in contrast to the findings using HT responses. As in HT, the effect for English is greater than the effect for Welsh. Comparing the time course of word recognition, a slight delay for bilinguals (significance unknown) was detected.

In other studies, bilingual infants also have been shown to exhibit later consolidation of their linguistic representations with respect to language differentiation (Bosch & Sebastián-Gallés, 1997), vowel discrimination (Bosch & Sebastián-Gallés, 2003), and consonant discrimination (Burns, et al., 2003). Older bilingual children show slower processing of language in speeded tasks (Mägiste, 1979). Whether these delays pose concerns depends in part on the value placed on knowing another language.

Vihman also commented on the language differentiation issue. When children differentiate between their two language systems is the question most often raised in studies of simultaneous child bilingualism. Perception studies strongly suggest that bilingual children do distinguish their languages from early on, and therefore, it should not be surprising that learning two languages takes longer than learning one. Based on production studies starting in the 1970s, there have been two propositions put forth based mainly on the evidence of children mixing words from both languages in the first word combinations:

1. Bilingual children have two separate language systems “from the beginning” (e.g., Genesee, 1989; Meisel, 1989); or
2. Bilingual children develop two systems only gradually, showing full language differentiation well after they begin to combine words and use grammatical morphemes (e.g., Volterra & Taeschner, 1978; Vihman, 1985).

Both of these propositions are now disputed. An alternative view is that children begin without a system. Instead, a linguistic system for each language emerges over time, and the first words produced draw on a single set of motor plans or possible word forms. Words that the child recognizes and can match closely enough for production are selected at first from either language (with situational priming). This item learning goes beyond the implicit pattern learning of the first year and does not constitute a system. In this view, neither bilinguals nor monolinguals begin with language system(s) in the period of first word production. A linguistic system for each language emerges out of the growing vocabulary of items known in that language. (See also Deuchar & Quay, 2000; Tomasello, 2000; Vihman, 2002.)

In conclusion, Vihman reiterated these points:

- The (implicit) identification of patterns with one of two languages takes a child longer than with only one input language because there are two systems to sort out;
- The formation of word representations—the beginning of explicit word learning—takes longer in bilinguals;
- The basic learning process appears to be no different and thus requires only adequate general exposure with access to one-on-one input in each language; and
- The question of “one system versus two,” which has dominated linguistic research on child bilingualism, is merely definitional and thus beside the point.

Discussion

There was a large amount of discussion of code switching. Young bilingual children tend to code switch or mix in words from the other language usually with function words (more, all gone, up, down) that seem to express relations or verbs from a child's perspective, possibly because they are more abstract. It is assumed that function words are not as firmly established in a child's brain as nouns (content words). Code switching has been observed in most but not all bilingual children in a variety of language pairs, for example, French-German, English-French, Estonian-English, and English-Spanish. Some researchers have observed that by about age 3, code switching begins to disappear; others have found that children's code switching begins to change around age 2 to resemble adult code switching, that is, involving content but not function words.

Another explanation is that code switching may be simply a word-finding issue, especially if children know the word in both languages. In some cases, a particular language may lack the words to express a certain concept or feeling. For example, there is no word for "resentment" in Swedish. The lack of a label for a concept can impact how one thinks. Teaching concepts is difficult to do even without the added complexity of bilingualism. The real question is whether acquiring two languages makes it easier or more difficult to align language learning. Does it make a difference that two languages do not map perfectly when there is no conceptual tension versus when there is tension because the problem space is allocated differently conceptually and linguistically in the two languages?

Additional discussion centered on the need to understand code switching in different contexts. For example, it may be interesting to study families and communities in which code switching is the norm, to describe common family code switching practices, and to determine what effect they have on children's language development. Studies of various contexts and situations could also better inform parents about evidence-based practices that could enhance children's language acquisition. It was noted that in Miami, a community where a tremendous amount of mixing is common, children growing up with "Spanglish" generally do not compare very well to Spanish or native English speakers. More international collaborations are needed to allow examination of a wider variety of language pairs.

Further discussion focused on the issue of linguistic systems. Code switching suggests an item-based approach that tends to be built up slowly and idiosyncratically rather than a system-based approach? The discussion about the presence of systems raised questions about whether one is in the process of culling a system or whether certain aspects of language acquisition are nonsystematic. This is an issue of both definition and level of analysis. The often-asked question of whether children are confused if they operate in more than one language suggests a vague but fundamental notion that children are prone to confusion. This promotes the use of terms like "system" to facilitate researchers' communication with practitioners even though it may not be the right way to frame the problem or to ask the question.

The discussion about item-based learning raised parallel issues of statistical learning. There are statistical regularities (frequency of certain patterns) that children recognize that may not be part of a system per se. Infants can detect regularities in the midst of irregularities and mistakes that adults make when speaking (Jusczyk, 1997; Saffran, et al., 1996) so much that researchers are beginning to explore constraints of what infants can learn from statistical regularities; that is, what can't they learn? Some literature suggests that statistical learning may not end with infancy.

Another point of discussion concerned how emerging language development maps onto conceptual development and comprehension in school-aged children, a highly debated issue. Existing evidence suggests that there are probably not two separate systems interwoven from the start. Both appear to be dynamic, gaining greater sophistication over time. It is both theoretically and practically important to trace these processes to understand differences between monolinguals and bilinguals as they develop from using one to two or more languages.

Participants recognized the need for both in-depth case studies and larger experimental studies. Results can look very different depending on the research methodology, but the merging of both will be required to move the field forward. Individuals in case studies may be very idiosyncratic in their bilingual language acquisition, and there may be a variety of trajectories that individual children follow. Transfer studies, a big topic in the field, are typically case based, which begs the question about how generalizable the findings are, even within language pairs. It is also important to consider the sociocultural context in which language and literacy are acquired. In the United States, because many children acquiring English happen to be poor and in schools where resources are inadequate, the community linguistic context is an especially important factor. Context is also important in terms of comparison groups in research; for example, much of the recent cross-linguistic research compares native speakers of a foreign language in a bilingual context with monolingual speakers in a monolingual context. These contextual differences should be kept in mind in the interpretation and generalization of findings.

From a theoretical standpoint, it is important to determine whether, in order to learn the language of the majority, children encounter negative transfer or suppression of the native language. There are also theoretical and practical reasons for examining whether processing speed is related to classroom performance. It was suggested that effect size may be a determining factor in prioritizing research foci such that effect size could be used to gauge the potential practical impact of findings. For example, children acquiring both English and Spanish are behind their English-only, same-aged counterparts in size of English vocabulary, which is seen as an important psycholinguistic finding because input makes a difference. But the effect size is only about 2 percent, approximately the same as the effect size of gender, thus diminishing the practical significance of the difference.

In terms of transfer effects and learning literacy, bilingual children bring to bear different abilities from monolingual children. Bilingual children appear to use whatever linguistic abilities they need—phonological, lexical, syntactic—to bootstrap their way into literacy learning and then drop them when they stop needing them. Thus, these abilities may not be strictly additive or facilitative. Research should approach differences as potentially reflecting varied competencies. This may be a situation in which comparing bilingual and monolingual individuals could be informative; by beginning with a base of competence in both, the researcher could treat competency as a potential confounding variable that is being controlled for.

A final area of discussion understood the most effective types of instruction for bilingual students, an important practical aspect of research into how bilingualism develops. For example, there may be different optimal instructional approaches depending on whether a child arrives in this country as a 6-year-old from Russia or China and is adopted into a monolingual family, or if a child arrives as a fifth or sixth grader having had several years of education in his or her first language. There are descriptive differences between monolinguals and bilinguals that certainly

need to be noted; however, the perspective is often to treat monolinguals as the reference group. Although theoretically interesting, the comparison between monolinguals and bilinguals may not always be the appropriate comparison always, especially in developing and testing instructional interventions.

Infant Studies of Language Acquisition

Growing up Bilingual: Phonological Processing

Janet Werker, University of British Columbia

The sound structure of language, or phonology, is used to discover where word boundaries are and to recognize grammatical markers (morphology). It is essential in oral language to understanding the meaning of an utterance (semantics). Every aspect of language, including the sound system, is essential for getting the full message from the speaker. Therefore, the study of phonological processing in bilinguals is relevant to every aspect of language use.

Dr. Janet Werker posed an overarching question: Is it possible to attain equal levels of facility in two languages? She focused on BFLA infants, reviewing research on language recognition, phonetic perception, and lexical use. The term “bilingual infants” refers to infants who grow with bilingual exposure, but who may not be necessarily bilingual. Language exposure was assessed using an adapted version of the questionnaire developed by Bosch and Sebastián-Gallés (1997).

A large body of research shows that monolingual neonates can discriminate between rhythmically distinct languages (e.g., English versus French) (Mehler, et al., 1988; Nazzi, et al., 1998). By 4 or 5 months of age, infants can discriminate between their own language and rhythmically similar languages (e.g., Spanish and Catalan), and between dialectal variations of the same language (Nazzi, et al., 2000; Ramus, et al., 2000). The standard finding is that monolingual 4-month-old infants orient faster to native or maternal language sounds (Bosch & Sebastián-Gallés, 1997) than to other language sounds. Previous research suggests that newborns show a preference for listening to their native language (e.g., Moon, et al., 1993). Bilingual infants orient more slowly to one of their native languages and more rapidly to the other language. Even at 4 months, bilingual infants can discriminate their primary language.

Factors influencing L2 phonetic discrimination in bilingual adults include age of acquisition of L2, perceptual distance between contrasts, and assimilability to L1. Some work suggests that even if both languages are acquired early in life, some difficulties maintain in L2 perception. Can early bilinguals achieve native competence in phonetic perception in both languages or is there language dominance even in infancy? To address this question, building on prior research, Werker undertook a study of prenatal listening experiences. She presented findings from a study conducted with Dr. Tracey Burns using data gathered using a high-amplitude sucking paradigm. Data on infants hearing one of the two languages to which she or he was exposed prenatally, collected over a 5-year period, suggest that both languages are equally dominant at birth in the BFLA infant. Newborn offspring of bilingual mothers appear to be keeping both familiar languages active.

However, in a study on vowel perception in infants (Bosch & Sebastián-Gallés, 2003), researchers tested three different language groups (Catalan monolingual, Spanish monolingual, and Catalan-Spanish bilingual) at ages 4, 8, and 12 months. Regardless of language background,

at 4 months, all infants perceived vowel differences. This finding suggests that the influence of language exposure is not present at ages younger than 6 months. At 8 months, only the Catalan monolingual group succeeded in perceiving the difference in vowels while the Spanish monolingual group no longer did. Bilingual infants finally succeeded in discriminating the vowel contrast at 12 months (Burns, et al., 2003). One possible explanation for the bilinguals' failure to perceive the Catalan contrast at 8 months is the distributional properties of the two Catalan vowels in comparison to the Spanish vowels; another is their bilingual exposure (Maye, et al., 2002).

Other research indicates that monolinguals' discrimination becomes language specific by the end of the first year of life while bilinguals show a bimodal pattern around 14 months of age—some bilinguals respond like monolinguals, with significant recovery to only French or English, while others dishabituate equally to both English and French category changes. More research is needed to understand why some bilingual infants can maintain sensitivity to both distinctions, whereas others show language dominance.

Werker concluded that the answer to whether it is possible to be equally competent in each of two languages is both yes and no. She asserted that perhaps it is not the best question nor is it necessarily best to use monolingual performance as the standard. It may be more valid to examine the functional requirements of being bilingual and to use bilingual acquisition as its own standard, then link the pattern of phonological perception to the functional requirements of bilingual use.

Links Between Linguistic and Conceptual Organization: Lessons From the Monolingual End of the Spectrum

Sandra Waxman, Northwestern University

Focusing on very young children, Dr. Sandra Waxman began with an overview of the puzzle of word learning and the mapping of linguistic and conceptual units. Word learning requires the subject to: (1) parse the relevant word from the speech stream; (2) identify the relevant entity in the world; and (3) establish a mapping between the word and the world. This is not an easy task, especially because it is a fundamental feature of human language that there are different kinds of words that all can be applied to the same scene. Different words direct attention to different aspects of that same experience, for example, nouns as categories of objects, proper nouns like names to reference individual objects, adjectives to describe properties of objects, and verbs that describe an action or relation.

Research on monolingual children has shown that by 2½ to 3 years of age, English-speaking children are very sensitive to each of these linkages, discovering the relevant linguistic units, the relevant conceptual units, and the mappings between them. The puzzle is how infants learn these skills. Which of these links (if any) between kinds of words and meanings are available at the onset of lexical acquisition? How are they supported by the structure of the native language being acquired? And how are these shaped over the course of development? Waxman has found that infants begin with a very broad, initial, universal expectation that words (in general) highlight commonalities (in general) (Waxman & Markow, 1995). Evidence of this is seen in 11- to 12-month-olds who map between words and concepts early on. This is then fine tuned over time, shaped by the language-specific structure of the particular language. Different languages

recruit grammatical forms differently in the service of making meaning. Thus, it matters how one maps grammatical forms in order to distinguish nouns, adjectives, and verbs.

By 14 months of age, English-acquiring infants are sensitive to (at least some of the) surface cues that distinguish nouns from adjectives and expect that different types of words highlight different types of relations among objects. This phenomenon is seen through novelty preference tests. Noun-to-category mapping is clear, robust, and replicable, demonstrating cross-linguistic and developmental stability. Adjective-to-property mapping is more elusive and later emerging (maybe 21 to 36 months of age), demonstrating cross-linguistic and developmental variability according to the structure of the language being acquired.

Waxman next described how languages vary not only in their sound patterns, but also in the cultural and social context in which they are used and in the ways these forms are recruited to convey meaning. Languages also vary in the relative salience of grammatical forms. For example, English and French tend to be noun heavy, focusing on object words; Mandarin and Japanese tend to be verb heavy, with verbs being able to stand alone without nouns.

There is, for example, an interesting structural difference between English and Spanish. In Spanish, adjectives and nouns parade around in each other's grammatical forms or syntactic frames more than in English. In English, nouns generally must be expressed (as in "I want the red cup"), but in Spanish, the noun can be deleted if meaning is recoverable from context. This overlap on semantics and distribution of syntax does have consequences in the language-acquisition pattern of older children. For example, monolingual-English 3-year-olds shown a picture of a dog and told it is a "bligit" can readily find the category and thematically related object if asked if there are any other "bligits." The same 3-year-old being asked about a "bligit-ish" (adjective) thing produces a more uncertain outcome compared to Spanish-speaking monolingual counterparts. Spanish-speaking children tend to extend the adjective to a category of objects because this is done commonly in their language. This example underscores the difficulties in explicating the word-learning process due to differences in input circumstances.

Waxman concluded that theories of acquisition probably apply to both monolingual and bilingual children. Although there is some knowledge about the structure of various languages and early conceptual development, it is not clear how L1 influences L2. There are likely some advantages and some impediments. Among the effects to consider is age, how the L2 gets reinforced, whether the L1 helps or impedes, and whether the different ways that languages can carve up the world pose a problem or an enriched exposure for a child. Waxman dismissed the notion that some languages conform to a child's cognitive predisposition more than others. It may be that certain languages are harder to acquire than others if they follow a different linguistic system.

Discussant Comments

Anne Fernald, Stanford University

Dr. Anne Fernald framed her comments around the following question: How can paradigms and perspectives used in research on monolingual language learning be used most productively to help us understand bilingual development?

She described three traditions or paradigms in research on monolingual acquisition that have not been always connected: (1) preverbal capabilities; (2) nature of early language development and

input; and (3) lexical and grammatical learning. She then traced historically how research questions have been framed in each of these particular paradigms.

With respect to research on preverbal capabilities (cf. Jusczyk, Kuhl, Werker, and Saffran), Fernald described early research in the 1960s and early 1970s as focused on single-syllable perception (i.e., Can children tell the difference between sounds in English?) and tending to be English centric. This tradition was initially quite divorced from linguistic questions and originated from research on speech and hearing, and then out of psychology. Only in the 1980s and 1990s did researchers begin to connect linguistic questions and cognitive development. Jusczyk made pioneering contributions, along with Kuhl and Eilers, on understanding children's ability to discriminate sounds and categorize things, and the seeming decline during the first year in sensitivity to speech sounds that are not in the native language. Research questions now are framed in truly a developmental way. She also noted Saffran's work on statistical learning, suggesting that children keep track of contingencies and transitional probabilities in ways that may help them get the language "system" going. These are primarily experimental studies in which all of the variables are closely controlled. The close control of such variables can raise questions about ecological validity if the experimental environment and stimuli appear unlike what real people experience or do in real life.

Research on early language environment (input) came from a very different direction (cf. Snow, Newport, Hart & Risley, Huttenloher). The initial question was whether children indeed learn to speak from the garbled speech that Chomsky claimed parents produce. Children could not possibly make sense of this garbled speech without a language system. More recently, there have been careful studies using quantitative measures of the nature of language input, for example counting words, which is confounded with such factors as SES. Tomasello and colleagues at the Max Planck Institute in Leipzig, Germany, are going back to a kind of heroic case-study method in which they record rich data to get at item-based learning questions. Mintz, et al., represent the computational studies approach that takes advantage of the computational power that is now available to demonstrate the possibility of tracking syntactic phrases and children's use of grammatical categories. It is possible to actually infer and induce categories by keeping track of regularities at some high level. For example, there is a 93-percent chance that an English-speaking child will have a noun follow the word "the." The field is gradually building the knowledge base leading to distributional knowledge and increasingly recognizing the need for better and more nuanced measures of input (e.g., What do you speak at dinner? What do you speak when watching TV with your brother? What are you watching on TV?).

Finally, the subfield of lexical and grammatical learning really represents two different paradigms: (1) linguistics/observational case studies, through the use of diaries (e.g., Brown) and questionnaires (cf. Bowerman, Clark, Slobin, Bates); and (2) experimental, usually from the psychology perspective (Markman, Waxman). Some researchers seem to straddle both paradigms (Tomasello), and some include syntactic frame and computational aspects (Tomasello, Lieven).

Studies of preverbal capabilities generally rely on experimental methods, cross-sectional designs, and samples grouped by age; focus on group differences; and have less interest in stability/variability issues, which often are not measured at all. Grouping by age may overlook other differences that are simply difficult to measure. Studies of lexical/grammatical learning and

input tend to rely on observational methods. Longitudinal designs and samples grouped by language level focus on individual differences and consider continuity versus variability. Because individual differences are likely to be an extremely important dimension of bilingualism, more needs to be said about the test-retest reliability and predictive validity of the measures being developed.

In this enterprise, in which predictability to school measures are of concern, there is a need to work with older children, not stop with grade three. What is the meaning of significant differences between monolinguals and bilinguals? How should negative findings be interpreted? When are they a concern? Longitudinal studies are critical to answering these questions. Convergent measures across different levels of language skill are needed to allow validation of measures.

Fernald is currently funded to extend her work on real-time spoken-language processing to Spanish-learning children. She has collected reaction-time measures from these children who are now 2 to 3 years old, looking at pictures while listening to speech, and then naming the pictures. One longitudinal study has shown that there are rapid gains in the speed and efficiency of spoken word recognition around the time of the “vocabulary spurt” (Fernald, et al., 1998). When age is controlled, children who are faster and more accurate also have greater vocabularies. Efficiency in on-line speech processing is correlated with growth in productive vocabulary; children that are faster and more accurate have greater vocabulary. The mean reaction time at 25 months is correlated with vocabulary size from 12 to 25 months (Perfors, et al., 2004).

Reaction time correlates with MacArthur Communicative Development Inventories (CDI). There is a cascading effect such that when words are grasped more quickly, resources are spared to learn the next word that much more quickly and to figure out the long-term dependencies essential to understanding syntax. Fernald commented that research could move forward more efficiently if we could promote collaborations to set up parallel research networks, gain larger sample sizes, and share ideas and resources to embrace the variability of individual differences.

Discussion

Researchers of language acquisition have tended to focus their efforts on questions such as how the process of language learning is different for bilinguals. The issue for the larger community is to understand whether there are clear benefits to being bilingual and to specify what these may be. Participants were urged to focus on a research agenda that would help address this latter concern. What are the most pressing research questions that should be pursued? Are new measures, methods, and research designs needed? Are there paradigms that may transcend disciplines? Are there better approaches for studying bilingual language development? Of particular interest are opportunities to increase and enhance communication among applied researchers and more theoretically inclined academic researchers, thus, merging the richness of one with the precision of the other.

Any kind of valid language theory must address all language learners. Yet current language-acquisition research remains largely focused on monolingual children. It is incumbent upon researchers to study bilingual language acquisition because bilinguals constitute a sizeable worldwide population as well as a growing proportion of the U.S. population. The ability of bilinguals to think in more than one language raises interesting conceptual questions about

whether bilingualism actually promotes added mental flexibility and creates a deeper reservoir of intellectual capacity. Another viewpoint posits that bilinguals are incredibly efficient at learning because they do not take twice as long to process language. Research on bilinguals may provide useful insights about language acquisition in general.

Bilingual effects are not always additive. It would be a mistake to connect an argument for the value of bilingualism to the assertion that there are no negative effects of bilingualism on any measure. If that turns out not to be true, it would undermine support for bilingualism quickly. One solution to this potential dilemma is to advocate for the goal of full bilingualism for everyone. If the outcome measure of interest becomes competence in more than one language, this changes the indicator of success. Part of the discussion needs to center on goals for bilinguals, for example, word formation at 14 months, reading at 4 years, or mastery of a set of vocabulary words. It is important to recognize that for a majority of children, bilingualism is not an option; it is a situation into which people are born. In this case, the question of whether bilingualism is beneficial for a child becomes moot. As there are enormous differences in language development, maybe a better question that is less politically charged is to ask what accounts for individual differences in bilingual achievement among bilingual children.

The conjunction between bilingualism and poverty was noted as a distinct feature of the U.S. situation that is not commonly the case in other countries. Participants discussed research designs that could help disentangle these effects. Some argued that much can be gained from international collaborations in cities where bilingualism is the norm (e.g., Montreal), in locations where two majority languages prevail (e.g., Quebec), and in countries that parallel in some way the situation in the United States (e.g., students of Turkish background learning Dutch in the Netherlands). Others suggested partnerships among researchers to obtain larger, more representative samples or approaches that control for SES by limiting the comparison sample to only poor children who are or are not bilingual, or conversely, high SES families such as those found in Miami where there is overwhelming social pressure to become monolingual speakers within three generations.

Another area of intense research is classroom instruction. For bilingual education, the initial goal was for children not to be held back from learning and to gain access to content through their primary language. Teacher reaction is important. Sometimes children are learning English in a hostile environment. How the teacher reacts to a child who does not speak English well, that is, whether the teacher speaks or teaches differently to a non-English speaker or gives the impression that the child is not as smart as more fluent English speakers, all contribute to a dynamic interaction that must be considered. The fact that instruction changes in different contexts makes it difficult to attribute effects solely to SES differences.

Some participants stated that a great deal of attention and research funding has gone to support studies of whether children do better in all English or some native-language instruction. The focus of much of the early research was not on effective instruction. Thus, questions have not been answered well. For educators, it is very important to know that something a bilingual child does at 14 months, which monolinguals can do at 12 months, is not necessarily a delay but could represent excellent progress. Such guidelines provide needed information for educators and parents deciding whether to categorize a bilingual child as a special education student. Language disorders and learning disabilities are presently difficult to recognize in bilingual populations.

Participants were encouraged to think about the development of new measures. Collaboration among researchers makes possible a broader reach in terms of piloting new measures. An example of the success of a collaborative approach can be seen in the research network on the Development of English Literacy in Spanish-Speaking Children supported by the NICHD and the Institute of Education Sciences (IES). The network has developed cross-project collaboration, has shared findings on an annual basis, and has developed a demographic survey instrument that captures language practices in the home and at school as well as teacher descriptors. This instrument and others developed by the network are available for others to share. (See <http://www.cal.org/delss>.)

A comment was made about exciting new research projects involving neuroimaging and bilingualism. The ways that bilingual, monolingual, and multilingual individuals conceptualize their worlds and the associated cognitive issues also are very important and interesting. In addition, meeting participants noted that basic developmental work on language attrition in bilingual children, in children with true communication disorders, and in children who have trouble learning language from the outset is needed, as these areas are understudied.

Studies of School Age Bilingual/ELL Language Development

Development of Literacy in Spanish-Speaking ELLS

Diane August, Center for Applied Linguistics

Previous research has found that Spanish phonological awareness and word reading significantly predict English word and pseudo-word reading for first grade students in transitional bilingual programs. Other studies have shown Arabic decoding in grade one to be predictive of French reading in grade three. In addition, those whose L1 has many cognates with English have an advantage in English vocabulary recognition, and successful bilingual readers all use certain strategies for comprehending both English and Spanish texts, for example, focusing on unknown words, using cognates as one source of knowledge, monitoring their comprehension, making inferences, and actively using prior knowledge. Unsuccessful readers focus much less on comprehension as the goal for reading.

Much of the research on transfer has been cross-sectional rather than longitudinal in design, a major shortcoming that makes it impossible to know whether transfer is real and not simply attributable to some underlying skill that impacts children's ability to be strong in both languages. Dr. Diane August has tried to address these issues in a longitudinal study that she has been leading with Drs. Maria Carlo, Margarita Calderon, and C. Patrick Proctor, Jr., for the past 5 years with funding from the NICHD, IES, and OELA. The study examines the development of literacy in about 180 Spanish-speaking children from El Paso, Boston, and Chicago who were followed from the end of second grade to the end of fifth grade. All of the children were native Spanish speakers, and instruction was conducted in English only, Spanish only, or Spanish and English (Spanish initially with transition into English reading instruction in third or fourth grade) classrooms. All of the students were in schools implementing *Success for All*² in Spanish and

² *Success for All* is a specific instructional program that is very scripted and focuses on all of the component skills, thereby increasing confidence of consistency in instructional factors across classroom sites. *Success for All* involves 90 minutes of uninterrupted reading instruction per day. Investigators observe classrooms to ensure fidelity.

English, thus affording the study some consistency of curriculum and instruction among the students.

This longitudinal perspective makes it possible to examine: (1) interlinguistic relationships—how initial skills acquired in Spanish relate to those components in acquiring English, that is, L1 and L2 interactions; and (2) intralinguistic relationships—relationships among various components of literacy within a given language. The project seeks to improve the understanding of whether earlier emerging skills are precursors to later emerging ones, how automaticity and fluency in earlier learning skills may impact later emerging skills, and sociolinguistic variations.

Interlinguistic relationships. Regression analysis was used to examine whether initial Spanish performance within each component of reading (e.g., phonemic segmentation, letter identification, word reading, pseudoword reading, word knowledge, and comprehension) predicted English performance on the same measure at the end of third or fourth grade. In each analysis, researchers accounted for the possible contributions of general ability, oral English proficiency, and initial English proficiency on the dependent variable of interest.

Results indicated that Spanish phonemic awareness, Spanish letter identification, and Spanish word reading were reliable predictors of English performance on parallel tasks at the end of fourth grade. The effect of Spanish phonemic awareness on English phonemic awareness emerged for all students. However, the effect of Spanish letter identification and word reading on English letter identification and word reading emerged only for students who had received formal instruction in Spanish reading. With regard to vocabulary knowledge, Spanish-instructed students knew significantly more cognates than English-only-instructed students, but the two groups did not differ on their knowledge of noncognates. These results are consistent with the hypothesis that reading skills that are acquired in school contexts can be transferred across languages. For passage comprehension, researchers found a positive relationship between Spanish passage comprehension at the end of second grade and English passage comprehension at the end of fourth grade, controlling for English oral proficiency, nonverbal ability, and language of initial reading instruction. Structural equation modeling currently is being used to examine relationships between Spanish reading at the end of second grade and English reading at the end of fifth grade.

Intralinguistic relationships. There is support for a comprehensive model of reading comprehension (Hoover & Gough, 1990) that posits vocabulary and phonological awareness make independent contributions to L2 comprehension for struggling Spanish readers (Carlisle & Rice, 2002). August and colleagues sought to extend the model further.³ A structural equation model of L2 (English) reading comprehension was tested on a sample of 135 Spanish-speaking fourth grade ELLs. The model included two levels: decoding and oral language. English decoding measures included alphabetic knowledge and fluency. English oral language measures included vocabulary knowledge and listening comprehension. The model had reasonable goodness-of-fit. Decoding skills played a less predictive role than oral language proficiency. L2 listening comprehension made an independent, proximal contribution to L2 reading comprehension, while L2 vocabulary knowledge assumed both proximal and distal relationships with L2 reading comprehension. Results suggest that given adequate L2 decoding ability, L2

³ It should be noted that Dr. C. Patrick Proctor is the lead author of this paper.

vocabulary knowledge is crucial for improved English reading comprehension outcomes for Spanish-speaking ELLs.

Influence of language of instruction. August also reported that for fifth grade English broad reading (i.e. a composite of word identification and passage comprehension), students instructed in Spanish and English and in English-only classrooms performed significantly better than children in Spanish-only instruction (based on adjusted means after controlling for second grade ability). By the end of fifth grade, children educated bilingually were not far behind those instructed only in English. For Spanish broad reading, students instructed in Spanish and English and those instructed only in Spanish performed significantly better than students instructed only in English.

New measures. A demographic survey was also employed to collect information about a child's home and school, with some questions about qualifications of teachers. The research group developed a test of Spanish phonology, a test of cognate awareness, and a test of morphology. A great deal of time was spent validating these new assessments, and the assessments were piloted on 200 to 300 students, revised, and then used with the research samples. These assessments are available for others to use (<http://www.cal.org/delss>).

School-Aged Children and Bilingualism: Effect on Literacy Development

Ellen Bialystok, York University

Learning to read requires the development of several prerequisite skills. Reading is a cognitive skill, unlike speaking or reciting numbers. It requires both specialized knowledge about how this skill is activated and executed, as well as the establishment of very specific concepts and cognitive processes that have to do with attention. In reading text, a type of mental gymnastics is needed to balance the amount of attention given to the text, meaning, etc. Finally, there are strong metalinguistic components to reading. A representational system implies that what is being represented has structure, just as letters represent sounds. These prerequisites are known to apply to children learning to read in general. Different kinds of languages are easier or more difficult to learn. For example, monolingual speakers of German have an easier time learning to read than monolingual speakers of English because German orthography is more regular.

For children who are bilingual, learning to read in a L2 may require the creation and possibly recreation of relevant concepts and cognitive skills in the L2. There is evidence to suggest that bilingualism affects, in some manner, the development of each of three skills that contribute to reading: (1) oral proficiency, (2) cognitive and attentional processes, and (3) metalinguistic awareness. In comparison to monolingualism, bilingualism tends to diminish oral proficiency, and its effect of depressing vocabulary development, which is apparent at 18 to 24 months of age, compromises one of the three critical skills needed for successful reading. However, there are clear advantages for bilinguals in cognitive, conceptual, and controlled attention skills. The ability of bilinguals to extract metalinguistic insights is not as clear. There is a great deal of variability depending on what task is being tested, with monolingual and bilingual outcomes largely equivalent. There are remarkably few studies on bilingual phonological awareness. Existing literature presents no clear patterns, with groups and tasks tested not entirely comparable.

Dr. Ellen Bialystok's research concerns the impact of bilingualism on cognitive processes, and to a lesser extent, some of the concepts associated with them. In her studies of literacy acquisition across languages, she has focused on bilingual children learning different pairs of languages in an attempt to isolate the linguistic, literacy, and cognitive factors that are responsible for learning to read and to determine whether bilingualism influences the acquisition of literacy. The aim is to distil what can be uniquely attributable to bilingualism.

Bialystok presented findings from two studies. In the first study, she compared monolinguals (N=40) with bilinguals from three language pairs: (1) Spanish-English (N=33), representing related languages with the same writing systems and same scripts; (2) Hebrew-English (N=30), representing unrelated languages, same writing systems, and different scripts; and (3) Cantonese-English (N=29), representing unrelated languages, different writing systems, and different scripts.

The groups had different initial levels of competencies in underlying reading component skills, such as vocabulary measures, which masked the ability to compare absolute progress in reading across groups. However, findings suggest that reading in each language is based on both shared and unique skills. Controlling for the development of prerequisite skills, bilinguals acquiring languages with different writing systems demonstrate a small advantage in learning to read, whereas bilinguals acquiring languages with similar writing systems have a large advantage.

Bialystok also studied 57 Cantonese-English bilingual children who speak Chinese at home, go to Chinese school, and speak English at school, focusing on measures of oral language proficiency, phonological awareness, and reading in both languages, and controlling for cognitive variables. The goal of this research was to determine the relation between reading and phonological awareness in each language and to examine transfer of skills across languages. Bialystok reported that phonological awareness predicts English reading but not Chinese reading and that phonological awareness correlates across languages but reading does not. She concluded that the cognitive advantages of bilingualism confer small benefit to literacy acquisition and that phonological awareness is common across languages but only facilitates reading in alphabetic systems (e.g., Hebrew, Spanish). The vocabulary deficit among bilinguals turns out not to make a big difference. The main bilingual advantage is in the transfer of skills for reading in similar systems.

Discussant Comments

Judith Kroll, Pennsylvania State University

In recent years, mainstream cognitive psychologists and neuropsychologists have shown greater interest in adult psycholinguistics and have recognized that the study of bilingualism offers the potential for profound insights into questions about cognitive processes, as well as the nature of cognitive architecture and its consequences. Dr. Judith Kroll has been studying language processing in adult ELLs for the past 20 years and presented what she viewed as major themes that may be applicable to research on children.

In the past 5 years or so, research on adult second-language learners and proficient bilinguals using comprehension and production skills has evolved. The old story was that early on competence in the L2 was fairly poor, and as proficiency developed, the ability to process the second language conceptually increased. It is now believed that even among very highly proficient bilinguals, there is activity in both languages almost all of the time. The goal is to

acquire sufficient automaticity to be able to function as monolingual in the L2. Being a proficient bilingual is about acquiring a certain degree of cognitive control to decide which word and which language to use. Thus, a proficient bilingual who has the phonology of the alternate language on the tip of his or her tongue is performing a cognitive feat that may provide insights into cognitive functioning in general, and its interface with language acquisition and production.

One issue has to do with constraints. There is evidence that the nature of initial language acquisition constrains future performance. One area of research that is underdeveloped is understanding where those constraints occur and the principles behind them. In the auditory domain, that is, speech perception and spoken word recognition, there is much more evidence of those kinds of constraints than there is for reading and visual word recognition.

In terms of understanding consequences of early bilingualism, it may be promising to consider neuroscience approaches or neuroimaging data. The fact that the brains of early bilinguals are different is a bit of evidence that needs to be taken seriously. Although a great deal of caution is needed to interpret limited results to date, one tempting conclusion or speculation is that, in fact, early bilinguals may have different access to executive function as compared to monolinguals. Kroll further cautioned that findings from adult learners may not generalize to children, underscoring the importance of further exploring this interface.

Discussion

The point was made that regardless of which language is being spoken by a bilingual individual, the other language is activated too; the language being spoken is not functioning necessarily autonomously. In lexical domains, interesting results have been found repeatedly from studies using eye-tracking methods and reading. One participant noted that native Spanish speakers who become proficient at English, at least for some set of structures, tend to parse sentences in Spanish as if for English. This suggests a great deal of permeability that has important consequences for theories of parsing in general. Another interesting area for additional research that is showing some promising findings is the relationship between lexical and grammatical development. Does a large lexicon in one language drive grammar in that language and carry over to the other? One study has found that English lexicon predicted English grammar and Spanish lexicon predicted Spanish grammar with very little crossover (Marchman, 2004).

In speculating on the reasons behind differences in reading and literacy study results, it is important to monitor the fidelity of instruction and to document the type of literacy instruction children are receiving in each language.

In terms of research design, it was noted that researchers in the United States tend to focus on individual differences, whereas researchers in Europe tend to focus on context. It may be promising to trade or combine approaches. For example, one may study outcomes for adult college students who receive no support for bilingualism. In making comparisons to other countries, one must be careful to control for SES, and the fact that norms are often based on data from upper/middle-class groups means that a representative sample in the United States is unlikely to reach the 50th percentile.

A great deal of discussion centered on instrument development. Translations alone, even with back translation, are often inadequate (Li, et al., 2000). Ideally, substantial fieldwork is

undertaken to validate new instruments. More recent norming data on today's children are needed because one cannot assume that psychometric features stay the same. Measures are needed for both direct testing and report. There are many challenges with language questionnaires; developing and validating a questionnaire could be a study in itself. Better developmental measures of oral-language proficiency and vocabulary in school age children are needed. Brief, easily administered measures are sorely needed for both screening and for use in large-scale studies. For example, it was noted that enormous benefit could derive from a CDI short form (20 to 30 out of 600 total items); however, this would assume that developmental data have been collected already, which is not always the case. Accuracy is an important issue for measures like the CDI, because items can vary by dialect. Another real but different issue is that by measuring vocabulary in only one language, only a part of the bilingual child's whole universe of words is captured.

Participants also were encouraged to consider creative ways to improve recruitment and retention of research participants. As an example, Fernald described her use of a rented house in East Palo Alto to increase the accessibility to her subject population. The rented house is 20 minutes away from Stanford University and has two laboratory rooms equipped with eye-tracking, cameras, microphones, and other technical accessories. It also serves as a community center, offering a number of classes. This facility, which will be in use for the next 4 years of the funded project, also helps to counter the purported Stanford University reputation of having students swoop in, collect a few data points, and graduate without benefit to the community under study.

Report Back From Breakout Groups

Meeting participants were assigned randomly to three breakout groups. The charge to the breakout groups was to identify and rank, if possible, the top 5 to 10 research questions or issues that should be considered of highest priority in the broad area of bilingual language development research. How could these research questions best be approached? Are there particular problems, approaches, methods, or designs that ought to be brought to bear on a particular area? Is it possible to group questions in a way that informs a programmatic research effort across federal funders and possibly across foundation funders?

There remains a broad need for basic research in the area of bilingualism that focuses on cross-linguistic fluency, processing, vocabulary, imaging, effects of age and proficiency, and competence versus performance. The three breakout groups identified many common themes and offered some specific suggestions for research questions, approaches, and priorities that are summarized below.

Descriptive Research on Bilingualism

Descriptive work on bilingualism is needed both in its social and cultural context (including input) and its cognitive and linguistic aspects to better understand learner groups and to map out and understand variation. Identifying where bilinguals' learning profiles differ from those of monolinguals would provide important information in attempting to ensure that bilingual children can become successful learners and literate in both languages. Such research should gather information about vocabulary in both languages and seek to identify skills needed to enhance the development of both languages. For example, instructional interventions may be developed and tested that could include making explicit how one may use cognates in both

languages to enhance vocabulary in both languages and making explicit strategies that learners can capitalize on to enhance their skills. A systematic understanding of the heterogeneity of bilingualism would factor in issues like timing for introducing L2 and the L1-L2 similarities in and interactions of different language pairs (how close in grammatical structure, sound system, writing system). Research at the intersection of bilingualism and special populations (including but not limited to those with learning disabilities or language impairments) also must be encouraged. These issues could be informed through large-sample, longitudinal studies beginning in the preschool years.

Change Across the Lifespan

There is a need to look at processes of change across the lifespan, not focusing just on very early development. These processes include the following:

1. Language development processes, not just outcomes
2. Bidirectional influences in bilingual development
3. The interface of language and cognitive processes and how it may change or maintain over the lifespan
4. The age at which bilingualism begins as a variable in all of the above

Large-scale and longitudinal research on language development in the middle school and high school years (including immigrant students who arrive in the United States in high school) is greatly needed, as there is extremely little research on these age groups. In particular, there is a need to include links between oral-language development and academic achievement—the kinds of language skills being developed and what kind are needed.

Parent-child and peer-peer interactions and their influence on literacy also were noted as important research topics, as was the issue of how these interactions are impacted by language and literacy. A fresh perspective on these questions may include consideration of African American adolescents who use Black English; dialect variation can be viewed as another form of bilingualism.

Measurement

There are a number of opportunities for measurement improvement. The development of formal, standardized assessment tools with good technical qualities is a high priority for both L1 and L2 languages. Assessments for English as L2 are needed; it should not be assumed that extant measures for native English speakers always are appropriate for English as L2. In particular, better assessments are needed for measuring language proficiency, vocabulary, phonology, syntax, pragmatics, and language ability. In addition, better measures of language and reading comprehension are needed, as are mechanisms for sharing instruments across laboratories.

Collaboration and Capacity Building

Greater collaboration across disciplines and across studies and/or laboratories is needed. In addition, creative approaches to funding are needed that will support combining smaller-scale, focused studies with a big science approach, as well as piggybacking supplemental projects onto larger existing studies. Postdoctoral training can be used to give new scientists hands-on research experience. Training the next generation of researchers and increasing interdisciplinarity should be a central part of ongoing and future research activities.

Environments That Enhance Development

Research is needed to better understand the role of environment and culture in language and literacy development and how issues of identity, classroom environment, and home environment promote success. Developing interventions that enhance the development of language and literacy will require research on instruction. In particular, studies of teaching strategies are needed that enhance not only bilingual language development but also academic achievement in English, transitions from bilingual to English educational programs, and optimal approaches to language maintenance, including in-depth descriptions of student characteristics. Research on successful bilingualism and successful teaching strategies should make strategies explicit that apply across languages, should be able to support and teach less successful students, and should identify both strategies children can use to learn and the extent to which they are used by successful and less successful learners.

In modern education, the multilingual classroom challenges instructors. In the context of a group of students in which multiple minority languages are spoken and the language of instruction is not the native language of the majority of students, creative instructional strategies must be developed and tested. Additional research also is needed on the most fruitful approaches to instruction in what have been thought of as more traditional bilingual classrooms, that is, those with large groups of students who speak the same non-English native language but are receiving or transitioning to English-language instruction. More studies are needed that address effective instructional interventions.

Within American culture in general and in certain specific communities, there is also a need to consider the perceived threat posed by people speaking another language in a predominantly monolingual community. Attitudes and stigmatization contribute to the community context of bilinguals in our midst and should be studied and better understood.

Wrap Up

Martha Crago, McGill University

Dr. Martha Crago, a Canadian American who after 40 years became an American Canadian, discussed her impatience, curiosity, and unorthodox approach given her theoretically varied background as she highlighted some of the key points from this workshop. Crago began by observing that the workshop succeeded in bringing this select group of researchers out of their “silos,” whether from a methodological, theoretical, or applied perspective, and encouraged permeability across disciplines and the creation of opportunities for the sharing and transfer of information and ideas. At the very beginning of the meeting, brief mention was made about the cost of bilingualism, which was mirrored by subsequent talk about the cost of monolingualism. The United States appears to be forsaking bilingualism in order to emphasize English acquisition or serial monolingualism.

A very wide methodological span was discussed, including surveys (cross-sectional to large longitudinal), HT preference and similar infant observational paradigms, ERP, and reaction time measures. Participants touched on important issues about the creative application of research tools to research questions and also shared with the group their fields’ theoretical and disciplinary constructions. To some extent, researchers still seem to fall into the social/cultural environment versus the cognitive/linguistic environment or the old nature/nurture dichotomy. To

really look at nature/nurture questions, partners such as sociolinguists must be enlisted, as well as social psychologists who study interrelationships and identity formation, and education and intervention researchers who can articulate theory and particular methodological strengths. Grammar as a pivotal part of language needs to be considered more forcefully. There is also a wealth of language socialization work that is underrepresented. For example, even if they may not be performing well in school, bilingual children bring enormous talents to help parents with poor English navigate the bureaucracy (cf. Pies-Alvares).

Theory-driven research and applied research form a complex link. Many educational researchers are driven to settle policy issues, and there is a need to infuse this type of research with greater scientific input. Although there is value to basic research, clinical ramifications argue for its having applied significance. The possible functional consequences of bilingualism, such as increased employment opportunities and as a hedge against cognitive declines that are associated with aging, highlight the importance of this link. Research in language development encompasses everything from perception to oral proficiency, to reading and writing, to how language is instantiated in the brain, and finally, the nature and quality of language input. There is enormous richness to studying language pairs.

Crago echoed earlier comments about the longitudinal aspect that is inescapable for the study of bilingualism. Change happens across the lifespan, and different learning and processing capabilities depend on the age at which bilingualism begins. There may be long-term consequences for bilinguals that are yet to be recognized and understood. In addition, there is a great deal of interesting research that can be done to study bilingualism and SES. Part of the research challenge is creating the proper tools for such research.

There needs to be ample funding to encourage research on bilingualism, which should include cross-method, cross-disciplinary, and cross-border studies. There is a clear need to buttress the multidisciplinary of grant application review panels and to broker funding to support interdisciplinary research. Support of training opportunities and spin-offs to large projects also should be considered. Postdoctoral fellows and daring assistant professors may be ideal recruits to this research area, but they would need support. However, topics addressed in this workshop are not ideal topics for ensuring tenure given their interdisciplinary features, making the undertaking of such research a somewhat risky venture, especially for nontenured faculty.

Research into bilingualism is crucial today. Although it plays out differently in other parts of the world, research on bilingualism does serve to elucidate an understanding of the human mind and an understanding of societal possibilities of other cultures, and how these can be used to educate children to prepare them to be citizens of the world.

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Appendix A

Biosketches of Presenters

Diane August, Ph.D., is a senior research scientist at the Center for Applied Linguistics and a principal investigator of a National Institute of Child Health and Human Development (NICHD)-funded program project grant focused on the development of literacy in English language learners. She is also staff director for a Department of Education-funded National Literacy Panel on Language Minority Children and Youth. Previously, she was senior program officer at the National Research Council and study director for the Committee on Developing a Research Agenda on the Education of Limited English Proficient and Bilingual Students. Dr. August also has worked as a public school teacher and school administrator in California, a legislative assistant in the area of education for a U.S. Congressman from California, a grants officer for the Carnegie Corporation of New York, director of education for the Children's Defense Fund, and an education consultant in evaluation and testing, program improvement, and federal and state education policy. She has a Ph.D. in education from Stanford University.

Ellen Bialystok, Ph.D., is distinguished research professor at York University, Toronto, Canada. Her research examines the cognitive and linguistic consequences of bilingualism beginning in childhood and, more recently, extending to adulthood and aging. Specific topics include the acquisition of literacy, the acquisition of executive processing, and the relation between representation and attention in monolinguals and bilinguals.

Martha Crago, Ph.D., is associate provost for academic programs and dean of graduate and postdoctoral studies at McGill University in Montreal, Canada. Dr. Crago is a professor and an internationally renowned language researcher whose numerous publications are focused on language acquisition and cultural patterns of language use in First Nations and Inuit communities in Quebec, as well as developmental language impairment in children speaking English and French. She has been awarded the Femme de Mérite Award in Science and Technology. She is a member of several multidisciplinary research teams from a number of faculties and a variety of departments. Dr. Crago obtained her bachelor's with honors in sociology and anthropology at McGill University in 1968, followed by a master's (applied) degree in speech-language pathology, and a doctoral degree in 1988 in human communication disorders.

Rebecca Eilers, Ph.D., is dean of the College of Liberal Arts and Sciences and presidential professor of psychology at the University of Maine. Dr. Eilers specializes in early child development, parenting, and cognitive and language development. Her current research interests focus on bilingualism and precursors to speech in infancy. She received a Ph.D. from the University of Washington, Seattle, in 1972.

Anne Fernald, Ph.D., is associate professor in the Department of Psychology at Stanford University and Director of Stanford's Center for Infant Studies. Dr. Fernald's research interests focus on the development of speech processing and language comprehension in infancy, parent-infant interaction, and cross-cultural research on the development of communication. She received her Ph.D. in psychology from the University of Oregon in 1982.

Fred Genesee, Ph.D., is a professor in the Psychology Department at McGill University, Montreal, Canada. He has carried out extensive research on alternative approaches to bilingual

education, including second/foreign language immersion programs for language majority students and alternative forms of bilingual education for language minority students. He is currently a co-investigator on a longitudinal national study of a number of two-way immersion programs in the United States. Dr. Genesee also is interested in basic issues related to language learning, representation, and use in bilinguals. His current work in this domain focuses on the simultaneous acquisition of two languages during early infancy and childhood; his specific interests include language representation (lexical and syntactic) in early stages of bilingual acquisition, transfer in bilingual development, structural and functional characteristics of child bilingual code mixing, and communication skills in young bilingual children. A new line of research will examine the language/speech processing skills of preverbal bilingual and second-language infants. Collectively, this work seeks to extend the understanding of the limits of the human faculty for language acquisition which, to date, has been based primarily on studies of monolingual acquisition.

Judith Kroll, Ph.D., is professor of psychology and applied linguistics at Pennsylvania State University. She is a cognitive psychologist interested in language and memory. Her particular interest is in the psycholinguistics of bilingualism, and her research examines both early stages of second language acquisition and fluent bilingual performance. In the acquisition work, her team has been examining why it appears to be easier for some people to acquire a second language than, others and what contexts of acquisition facilitate conceptual understanding of words in the second language. In the work on language processing in fluent bilinguals, the research team especially has been interested in how bilinguals juggle the mental competition between words available in each of their two languages to produce words in the language in which they intend to speak. This research is being pursued in collaboration with colleagues in The Netherlands. Dr. Kroll received her Ph.D. from Brandeis University in 1977.

Peggy McCardle, Ph.D., M.P.H., is associate chief of the Child Development and Behavior Branch at the Center for Research for Mothers and Children within the NICHD. Dr. McCardle holds a bachelor's degree in French, a doctorate in linguistics, and a master's degree in public health. Early in her career, Dr. McCardle was an elementary classroom teacher. She has held both university faculty positions and hospital-based clinical positions and has published articles addressing various aspects of developmental psycholinguistics, as well as issues in public health. At the National Institutes of Health (NIH), she served as a scientific review administrator and as a senior advisor to the Deputy Director for Extramural Research in the Office of the NIH Director before joining the NICHD. In addition to her duties as associate chief, she directs the research program in Language, Bilingual and Biliteracy Development and Disorders, which includes three interagency-funded research networks: the Biliteracy Research Network (development of English literacy in Spanish-speaking children); the Adult Literacy Research Network; and the new Adolescent Literacy Research Network. She also serves as the NICHD liaison to the National Reading Panel, is on the steering committee of the National Literacy Panel for Language Minority Children and Youth, and leads or serves on various interagency working groups.

Marilyn Vihman, Ph.D., is professor of developmental psychology at the University of Wales in Bangor. Her research interests center on early vocal development including prosody and the acquisition of accent, origins of phonological representation, transition to syntax, and child bilingualism.

Sandra Waxman, Ph.D., is professor in the Department of Psychology at Northwestern University. Her research interests include cognitive development, language and conceptual development in infancy and early childhood, acquisition of concepts, word meaning and reasoning, and early inductive reasoning. She has done research on links between early linguistic and conceptual development and comparisons between monolingual and bilingual children. Dr. Waxman earned her B.S. magna cum laude from the University of Pennsylvania, her M.A. in psychology from the Johns Hopkins University, and her Ph.D. in psychology from the University of Pennsylvania in 1985.

Janet Werker, Ph.D., is professor of psychology and research director of the Infant Studies Centre at the University of British Columbia. She is also the Canada Research Chair in Psychology, a senior scientist at the Brain Research Centre, a faculty associate in the graduate program in neurosciences and an associate member of audiology and speech sciences at the University of British Columbia. Dr. Werker's research focuses on understanding the maturational and experiential factors that make possible a child's entry into language acquisition. Her work focuses primarily on development during the first 2 years of life, a critical period for language acquisition. She was elected a Fellow of the Royal Society of Canada in 2001, and became a Fellow in the Canadian Institute for Advanced Research Experience-based Brain and Biological Development Program in 2004. Dr. Werker received her B.A. from Radcliffe College, Harvard University, and her M.A. and Ph.D. from the University of British Columbia in 1979, and 1982, respectively.

Appendix B

Workshop Participants

Shanley Allen, Boston University

Diane August, Center for Applied Linguistics

Ellen Bialystok, York University

Linda Cote, National Institute of Child Health and Human Development (NICHD),
National Institutes of Health (NIH), U.S. Department of Health and Human Services (DHHS)

Martha Crago, McGill University

Timothy D’Emilio, Office of English Language Acquisition, U.S. Department of Education (ED)

Rebecca Eilers, University of Maine

Anne Fernald, Stanford University

Fred Genesee, McGill University

Brian Goldstein, Temple University

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