An Alternate Route for Preparing Deaf Children for BiBi Programs: The Home Language as L1 and Cued Speech for Conveying Traditionally Spoken Languages

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This article focuses on nonsigning hearing parents of deaf children who share the goals of bilingual-bicultural (BiBi) programs for their child, opt for their home language to be their deaf child’s first language (L1), and have questions about communication options (e.g., oral methods, manually coded English [MCE] systems, or Cued Speech) for conveying that language. We present research findings related to the effectiveness of MCE systems and Cued Speech for conveying English and developing deaf children's reading abilities. We compare the cueing of English and the signing of MCE systems in terms of theoretical and practical advantages. Finally, we suggest research needs.

Ultimately, all Deaf children and adults deserve complete and consistent accessibility to ASL and to English.
—Nover, 1995

Despite the widespread use of manually coded English (MCE) systems during the past 20–25 years to model English language for deaf children in the United States and prepare deaf children for literacy, reading achievement scores remain virtually the same today (1996 Stanford Achievement Test Norms) as they were before the development of MCE systems. Disappointment with reading achievement scores has led some to propose that English and other traditionally spoken languages are inherently more difficult to acquire for deaf children than signed languages. This view provides a basis for many of the recently developed bilingual-bicultural (BiBi) programs (Strong, 1995) that incorporate American Sign Language (ASL) as L1 and the language of instruction for developing English as a second language (L2). While most current BiBi programs and models of BiBi education incorporate ASL as L1 and the language of instruction for developing English literacy (Hoffmeister, 1990; Johnson, Liddell & Erting, 1989; Lane, Hoffmeister, & Bahan, 1996; Livingston, 1997; Paul, 1990, 1992, 1993; Quigley & Paul, 1984; Strong, 1988; Vernon & Andrews, 1990), others propose that the home language (i.e., native language) of the parents be the deaf child’s L1 (Cornett, 1991); and others recommend both signing ASL and cueing English in an interactive model of BiBi instruction (Cornett, 1991; Liedel & Paul, 1991).

This article provides support for the view that there are multiple routes to the achievement of BiBi education goals. An additional route to that in which ASL is proposed as L1 for all deaf children—one which some nonsigning parents are currently electing—is for the home language to be L1. An issue for nonsigning hearing parents who opt for that language to be L1 is how to model their home language clearly and completely to their deaf child. The MCE systems, developed more than 30 years ago to convey English clearly, have, arguably, been limited in their success (Drasgow & Paul, 1995).

As background for discussion of the view about preparing deaf children for BiBi programs by developing the home language as L1, we will discuss (1) the
biological predisposition of children to learn language and the role of parents in developing children's language during the critical language learning period; (2) relevant language learning issues in deaf education, including the issues of whether ASL or English should be L1 for deaf children and whether the critical issue in deaf education relates to the nature of language (signed or traditionally spoken) or language access; and (3) the relationship of phonological abilities to reading, including research related to rhyming, phonological recoding, and phonics abilities of deaf readers. We will then compare the cueing of English and the signing of MCE systems by describing each system, presenting research findings related to the effectiveness of each system, and comparing the two systems in terms of how clearly and completely each conveys English (including the phonological aspects of English), the memory load involved in learning to sign MCE systems and cue English, and relative cognitive (i.e., translation) requirements involved in signing MCE systems or cueing English.

We acknowledge that, in the ideal world, parents desiring their children to be bilingual would provide the deaf child access to both ASL and English in the home during the preschool years. Such an arrangement would provide the deaf child the optimal opportunity to develop both languages in preparation for academic programs and learning to read and write in BiBi programs. Realistically, however, many deaf children will be exposed to only a single language in the home, and research has shown that the language is likely to be that of the mother (Kluwin & Gonter Gaustad, 1991). Since that language for many families is likely to be a traditionally spoken language (e.g., English), the focus of this article is on language access, or communication, issues—specifically, those faced by nonsigning hearing parents of deaf students who opt to have their home language be L1 for their deaf child and have questions about communication options (e.g., oral methods, MCE systems, or Cued Speech).

**Perspective on Language Learning**

**The Biological Predisposition to Learn Language**

All children, regardless of their hearing status, language (signed or spoken), or national origin, are biologically predisposed to acquire a language (Gee & Goodhart, 1988; Goldin-Meadow & Mylander, 1990; Klima & Bellugi, 1979; Lenneberg, 1967; Marler, 1990; Pettito & Marentette, 1991). No matter how complex the phonology and syntax of a language, it is the unusual child with sensory access to the "continuous phoneme stream" and sufficient opportunities to interact with that language, who does not discover the rules of that language in a very short period of time. Further, children in all parts of the world, regardless of the complexity of their home language, acquire the rules of that language in remarkably similar patterns related to the phonological contrasts of the language and rules governing its morphology, syntax, semantics, and pragmatics (Lenneberg, 1967). Specifically, children in different parts of the world tend to utter their first word around the time they take their first steps, lose the ability to produce phonemes not in their native language by the time they are two years of age, and acquire the major components of their native language by the time they are three or four years of age (Berko Gleason, 1993). For example, by the age of 6 years, children regularly exposed to the English language typically master all of the regular morphological inflections of English, use compound and complex sentences, and have receptive vocabularies estimated to be as large as 25,000 words (Just & Carpenter, 1987).

Access to the continuous phoneme stream is only one element in acquiring a language. Also important for developing linguistic competence are early exposure to the language and opportunities to interact with it. Findings related to both feral and neglected children suggest that there is a critical period (0–6 years), or sensitive age for first-language learning (Curtiss, 1977; Lane, 1976; Rymer, 1992).

**The Role of Parents During the Critical Language Learning Years**

Children acquire language naturally with access to and interaction with fluent language users during the preschool years. Typically, those language models are the child's parents. Parents, regardless of whether their child is hearing or deaf, are ultimately responsible for providing the optimum language learning environment for their child. That environment can be characterized as one that is fully accessible; interactive; spontaneous
and natural (as opposed to contrived or formal); conducive to numerous opportunities for developing linguistic competence through games, daily living activities, excursions with family members and friends, storytelling and reading of stories, and other age-appropriate activities; and one in which the parents feel empowered to develop their child's language. Schlesinger (1988) found that hearing mothers of deaf children reported feelings of powerlessness over their ability to parent or communicate with their child. Schlesinger reported that such feelings of powerlessness have been found to be a powerful predictor of deaf children's later academic achievement.

Most parents of hearing children do not face decisions related to which language should be modeled for their hearing child. These parents, whose home language is a traditionally spoken language, are able to model their language their hearing child. Similarly, Deaf parents whose home language is a signed language, such as ASL, British Sign Language (BSL), or Langue Signe de Quebec (LSQ), are able to model that language for their deaf child. However, hearing parents, whose home language is a traditionally spoken language, need to decide whether to attempt to model the home language, a signed language, or a combination of the two for their deaf child. An additional issue for nonsigning hearing parents of deaf children is how to convey conversationally (e.g., oral methods, signs, fingerspelling, or cues) their traditionally spoken home language clearly and completely to their deaf child.

Language Learning Issues in Deaf Education

ASL or English as L1 in Preparation for BiBi Programs?

Historical overview. Language and communication have been issues in deaf education in the United States since the American School for the Deaf was opened in 1817 (see Van Cleve, 1996, and Moores, 1996, for an historical overview). The issues have focused on whether ASL or English should be the deaf child's L1 and how English should be conveyed (e.g., orally, fingerspelling, signing, or cueing). During the past 20–25 years, most parents have opted to use some form of signing with speech (e.g., MCE systems) in order to convey English to their deaf child. During the past decade, an increasing number of educational programs serving deaf children have considered or have adopted a bilingual perspective to educating deaf children that includes both ASL and English (Strong, 1995). Strong attributes this movement, in part, to the increased societal awareness of the importance of sign language in the lives of deaf people (p. 84). Clearly, another influence on BiBi programs is the expansive bilingual movement in general education. It is generally accepted that hearing children who enter bilingual programs with an intact L1 are better prepared to acquire L2 and develop literacy. This view is supported by large-scale studies conducted with hearing children in bilingual programs who are learning English as a second language (Mace-Matluck, Hoover, & Calfee, 1984) and language learning theory, including the Linguistic Interdependence Theory (Cummins, 1989). Currently, a major issue related to BiBi education for deaf children is whether ASL or English should be L1 for deaf children.

Support for ASL as L1. The bulk of the professional literature, to date, supports the use of ASL as L1. In one view, English and other traditionally spoken languages cannot be easily acquired by deaf people (Strong, 1988; Vernon & Daigle, 1994). Support for this view is often in the form of statistics (Holt, 1993; 1996 Stanford Achievement Test Norms) revealing that, despite the proliferation and widespread use of MCE systems during the past 20–25 years, reading achievement levels of 18-year-old deaf students remain virtually the same (i.e., 3rd to 4th grade) as they were before MCE systems were developed. Studies tending to support this view are those showing that deaf children of deaf parents who (presumably) use a signed language (e.g., ASL, BSL, or LSQ) with their deaf children, score higher on standardized achievement tests than their peers who have hearing parents (Jensema & Trybus, 1978; Schlesinger & Meadow, 1972; Vernon & Koh, 1970). See Marschark (1993), however, for a discussion of whether existing research supports the view that deaf children of deaf parents are necessarily higher achievers.

Additional support for ASL as L1 for deaf children comes from studies of spatial and sequential memory abilities of deaf and hearing individuals (Belmont, Karchmer, & Bourg, 1983; Belmont, Karchmer, & Pilkonis, 1976; Blair, 1957; O'Connor & Hermelin, 1972; Stuckless & Pollard, 1977; Withrow, 1968). These
studies support deaf individuals’ superior performance on spatial memory tasks when compared to performance on sequential memory tasks. The significance of such studies is that ASL and other signed languages tend to rely more on spatial memory while English relies more on sequential memory.

Other support for ASL being L1 for deaf children (Lane et al., 1996) is the view that ASL and other signed languages are the only “natural” languages for deaf children because of their visual accessibility. Support for this view comes, in part, from these authors’ observation that deaf children of deaf parents typically develop signed languages naturally.

Theoretical support cited for ASL being L1 in preparation for BiBi programs and English literacy is Cummins’s (1989) Linguistic Interdependence Theory (Hoffmeister, 1990; Israelite, Ewoldt, & Hoffmeister, 1992). In Cummins’s view, competence in L1 provides the basis for developing competence in L2.

Support for traditionally spoken languages as L1. Mayer and Wells (1996, p. 104) question the validity of using Cummins’s Linguistic Interdependence Theory to support ASL as L1 to develop English literacy in BiBi programs. They argue that there are five critical conditions to be satisfied before the theory can be applied. These critical conditions relate to (1) the languages viewed to be interdependent (e.g., ASL and English literacy) and (2) characteristics of the language learners (p. 104), specifically, (a) each language needs a written form that corresponds to its spoken form, (b) the external mode of each language can serve as a bridge between the mode of inner speech and that of written speech, (c) the reader already has some level of mastery of the written mode of L1 before attempting to master the written form of L2, (d) there are adequate opportunities for the student to be a fluent speaker of L2, and (e) in both languages, the written form is used for a wide variety of functions, some of which are relevant to the student’s purposes. Mayer and Wells indicate that when all of these conditions are met, the two languages can become independent; however, the authors note (1996, p. 105) that for purposes of supporting ASL as L1 to support English literacy, none of these assumptions can be assumed; thus the Linguistic Interdependence Theory cannot be appropriately applied as support for the model of ASL as L1 leading to English literacy for deaf students. Although there have been attempts to develop a written form of ASL, a standardized, literate system is not currently in widespread use (Paul & Jackson, 1993). (See Mason, 1997, for a rebuttal to Mayer and Wells and Mayer and Wells, 1997, for a rebuttal to Mason on the applicability of the Linguistic Interdependence Theory for BiBi models of instruction incorporating ASL as L1).

Perhaps the strongest support for English or another home language being L1 for a deaf child relates to the difficulty some hearing parents experience in trying to learn a new language (e.g., ASL). A number of concerns have been expressed about the ability of hearing parents to develop ASL competency sufficiently during the critical language-learning (preschool) years to serve as appropriate language models for deaf children. Representative of these concerns are those of Kemp (1998), Vernon and Daigle (1994) and Strong (1988). Vernon and Daigle assert that hearing parents “will never be ASL models, enabling their deaf child to absorb ASL in the same way hearing children pick up English from their hearing parent models” (p. 124). Strong states that if hearing parents are not fluent with ASL prior to the birth of their child, they are attempting to model a language that they themselves are trying to learn. He notes that the typical difficulties in learning an L2 after puberty, combined with the emotional distresses of having a deaf child, “make it highly unlikely that the parents will succeed in providing a good language model for their children.” Strong concurs with Cornett (1991) that in order for deaf children to realize their linguistic potential, deaf children “need consistent language input” (p. 103).

The Critical Issue: Language or Language Access?

In this article, we do not focus on the issue of which language should be L1. We assume, as do Lane, Hoffmeister, and Bahan (1996), that signed languages are accessible to deaf children who interact with native speakers of such languages. The focus in this article, instead, is on whether (and if so, how) English and other traditionally spoken languages can be acquired naturally as L1 by deaf children. For such a discussion, it is important to distinguish a “natural language” from learning a language “naturally.” A natural language is defined as evolving over time in a community of indi-
viduals who need to communicate with one another, where the phonology, morphology, syntax, and pragmatic aspects develop to the point that it is considered a language (Cairns, 1996). The key to acquiring any language (spoken or signed) "naturally" is access to that language (and its phonological, morphological, syntactic, and pragmatic aspects). Deaf children of deaf parents, who have been exposed to a signed language at home, have been found to acquire that language in essentially similar ways and through similar processes as hearing children of hearing parents (Bellugi, 1980; Bonvillian & Folven, 1993; Petitto & Marentette, 1991). Likewise, deaf children of hearing parents, who have been exposed to a cued language (e.g., English) at home, have been found to develop the written forms of English and other traditionally spoken languages in essentially similar ways and via similar processes as hearing children (Alegría, Dejean, Capouillez, & Leybaert, 1990; Alegría, Lechat, & Leybaert, 1990; Cornett, 1991; Leybaert & Alegría, 1993, 1995; Leybaert, Alegría, & Foncke, 1983; Leybaert & Charlier, 1996; Perier, Charlier, Hage, & Alegría, 1988; Wandel, 1989).

In our view, language access, rather than the nature (signed or traditionally spoken) of the language, explains the difficulty many deaf children of hearing parents have had in acquiring competence in conversational English and English literacy via MCE systems. In the remainder of this article, we will present research findings from studies conducted with deaf and hearing readers that have investigated the role of phonological processes (i.e., rhyming, phonological recoding, and phonics) to fluent reading. We will then compare MCE systems and Cued Speech in terms of how clearly and completely each conveys the phonological aspects of English, the memory involved in learning each system, and their respective cognitive requirements.

Reading and Phonology

Reading: A Complicated Process

Reader, text, and task variables. In order to understand the importance of phonology to reading comprehension, it is important to comprehend the nature of the reading process, including the role of working memory. Risking oversimplification of a complicated, multifaceted process, reading comprehension can be viewed as an intricate intertwining of (1) reader characteristics, including perceptual, cognitive, metacognitive, and linguistic abilities, memory, background knowledge, and motivation; (2) text characteristics, including structure and cohesion; (3) task characteristics, related to test format and type of comprehension being assessed; and (4) a "tricky mix" (Nelson & Camarata, 1996) of learning conditions, including self-esteem and related factors.

Models of the fluent reading process can be roughly categorized as being text-based, reader-based, or interactive (Paul & Jackson, 1993). Bottom-up approaches to reading instruction (Gough, 1972; LaBerge & Samuels, 1974) are generated from text-based models that emphasize graphic information and sound-letter correspondences on the printed page more than the reader's background knowledge. Top-down approaches (Goodman, 1976; Kolers, 1972), in contrast, are generated from reader-based models that emphasize what the reader brings to the reading situation as opposed to what is on the printed page. In interactive approaches (Carpenter & Just, 1981; Rumelhart, 1977; Stanovich, 1980), good readers are viewed as integrating information from the text with their own knowledge to construct meaning (Anderson & Pearson, 1984). To that end, readers sometimes apply top-down strategies, while at other times, they apply bottom-up strategies (see Kelly, 1995; King & Quigley, 1985; Paul, 1993, 1997, for a discussion of interactive theories of reading in the context of deaf readers).

The relationship of working memory to reading. The relationship between working memory and reading has long been recognized. Earlier views of working memory (Miller, 1956; Smith, 1997) conceptualized working (i.e., short-term) memory as a finite, temporary storage unit, capable of holding 5–7 unrelated units. Current thinking (Baddeley, 1986, Baddeley & Hitch, 1974; Chalifoux, 1991; Garrison, Long, & Dowaliby, 1997; LaBerge & Samuels, 1974) supported by research with hearing students (Daneman & Carpenter, 1980) as well as deaf students (Garrison et al., 1997), views working memory as dynamic and responsible for both simultaneously maintaining information just read while processing previously read information. In this view, working memory during reading must be shared
between processing and storage demands to which the working memory is applied. When processing demands, such as word recognition, are excessive (as they are likely to be for younger or less-skilled readers), storage capacity is reduced. Readers with inefficient processing abilities, whether related to phonological recoding, syntactic processing, or other processing abilities, suffer from reduced working memory capacity as more energy is devoted to the processing of information, such as word identification.

To illustrate the importance of working memory while reading, consider the following English sentence: “Mr. Green's big, white, colonial house, on the grassy knoll, behind Maple Street, was recently demolished by a bulldozer.” There are at least eight propositions in this sentence, including: (1) a bulldozer demolished a house recently, (2) Mr. Green has a house, (3) the house is big, (4) the house is white, (5) the house is colonial, (6) the house is on a knoll, (7) the knoll is grassy, and (8) the house is behind Maple Street. These units of meaning are related but are expressed in a sentence of almost 20 words with a passive verb that puts the subject (bulldozer) at the end of the sentence. The key point of this sentence, (i.e., the house was demolished) might be missed by a reader who tries to hold each piece of information in working memory until the end of the sentence.

The Role of Phonological Representations in Reading

**Phonemes and prosodic information.** All traditionally spoken languages consist of phonology, morphology, syntax, semantics, and pragmatics (see Berko Gleason, 1993). The phonological aspect of language includes both segmentals and suprasegmentals: phonemes and prosodic features. Phonemes, considered the most basic “building blocks” of a language, are combined to form morphemes (i.e., the smallest meaningful units of the language), which are, in turn, combined to form sentences, paragraphs, and larger units of discourse.

The prosodic features of language, including the stress, intonation, and rhythm of utterances, convey different information. For example, speakers raise or lower the volume of their voices to reflect the intimate versus public nature of their utterance, convey emotions (e.g., anger, anxiety, impatience), or reflect the emphasis they wish to make. They alter the intonation of their voice to indicate whether they are asking a question or making a statement. Prosodic information about English, when visually accessible and acquired, can provide a basis for teaching the deaf child how modifications of printed text provide similar information. Examples are (1) italicized or boldface type used to convey stress (You want to go?; You want to go?), (2) invented spelling used to convey articulation differences typical of informal speech (I wanna go to the store), or (3) punctuation used to distinguish statements from questions (You want to go?).

Visual prosodic information exists in signed as well as traditionally spoken languages. For example, Valli (1995) provides examples of ways in which hand shape, repetition, and other phonological features of ASL convey rhythm, duration, and stress in ASL poetry. Similarly, evidence of deaf cuers utilizing visual prosodic information while conversing has been reported (Metzger, 1994). Based on Tannen's (1989) description of phonological involvement strategies in spoken discourse, Metzger examined such strategies used by two deaf cuers engaged in a cued conversation. Strategies found to be used by deaf cuers included vowel, or hand placement, repetition; consonant, or handsign repetition; and the visual representation of rhythm, duration, and stress represented by head movement and/or lengthening of the duration of a cue.

The relationship of phonological processes to reading comprehension. Three primary phonological processes found to be related to reading in hearing students include rhyming, speech codes (i.e., phonological recoding) related to working memory, and phonics. Each involves phonological representations that have been collectively termed “inner speech” abilities (Besner, 1987).

1. Rhyming. Rhyming abilities have been found to be a particularly strong predictor of later reading achievement for hearing students (Bradley, 1988; Bradley & Bryant, 1983, 1985; Bryant, MacLean, & Bradley, 1990; Bryant, MacLean, Bradley, & Crossland, 1990; Ellis & Large, 1987; Lundberg, Olofsson, & Wall, 1980; Maclean, Bryant, & Bradley, 1987). Bryant and colleagues found a causal link between early rhyming abilities and later reading. Although reasons for the link are not clear, Bowey and Francis (1991) speculate that children’s experiences with rhyme allow them to form categories of words that share common sounds and that,
later, they are able to make connections between these categories and words that might share common spelling patterns. For example, knowing that rough, tough, and enough rhyme might help children understand that these words share a common spelling sequence as well as a common rhyme. Goswami and Mead (1992) provide evidence that children do link rhyming categories with spelling categories as soon as they begin to learn to read and spell; however, as Leybaert (1993) points out, the spelling-rhyming link is not consistent and can be misleading (e.g., in the words cough, bough, and through).

2. Phonological recoding. Utilization of “speech”-based codes (i.e., phonological recoding) in working memory is a second cognitive ability related to reading of hearing students. The link between “speech”-based codes and working memory relates to the efficiency of phonological representations for retaining temporal-sequential information in working memory. For example, young or less-skilled readers may need to temporarily store a string of letters or syllables in working memory while phonically assembling a word. More advanced readers may need to temporarily store written words, such as medial relative clauses or truncated passive voice, while reading complex text, until their relationships to other words are discovered and decisions are made about what to do with the information. (See Baddeley, 1986, for a detailed discussion of working memory and Bebko & Metcalfe-Haggert, 1997; Garrison et al., 1996; Marschark, 1993; Novack & Bonvillian, 1996; and Rodda, Cumming, & Fewer, 1993, for discussions of working memory related to deaf individuals).

3. Phonics. Phonics (i.e., knowledge of the phoneme-grapheme relationship), is a third aspect of reading affected by an individual's phonological knowledge. Phonics involves mapping one's knowledge about the phonemes of a language to the graphemes of that language. To the extent that a language is phonically-regular (i.e., there is an exact, one-to-one correspondence between its phonemes and graphemes), readers can “phonologically assemble,” or “sound out” words previously not encountered in print. For example, readers can apply their knowledge of phonics to decipher the following phonically decipherable word, k h a i r a k t u r i z t i k u l l e e (“characteristically,” LaSasso, 1996), or the following sentence, “If yew kan sowned owt thiss sentunnus, ewe wil komprihenned itt” (Baddeley, 1986). Although English is not as phonically-regular as some languages (e.g., Spanish), much of English is phonically regular. A hearing reader who pronounces a series of phonemes, which were meaningful when previously heard, will likely have that same meaning triggered via auditory feedback when the reader “hears” that word, via actual speech or inner speech.

Research Related to Phonological Abilities of Deaf Individuals

Rhyming. Findings from earlier studies of deaf individuals' rhyming and spelling abilities, conducted with subjects from oral and/or signing backgrounds (Campbell & Wright, 1988; Dodd & Hermelin, 1977; Hanson & Fowler, 1987; Hanson & McGarr, 1987; Parasnis, 1996), taken collectively, suggest that orally educated deaf individuals, as well as native signers, experience difficulty in making explicit phonological judgments about written words or pictures. Further, research findings suggest that rhyming abilities of deaf students are distinct from both orthographic rhyming (Campbell & Wright, 1988; Conrad, 1979; Hanson & Fowler, 1987; Hanson & McGarr, 1987) and speechread rhyming (Dodd & Hermelin, 1977; Leybaert & Charlier, 1996). Leybaert (1993) conjectures that phonological representations in deaf students from oral or signing backgrounds may be insufficiently robust to support rhyme judgment; thus, they must rely on misleading orthographic or speech-read information (p. 302).

Several recent studies (Charlier, 1992; Leybaert & Charlier, 1996) examined rhyming abilities of deaf subjects with Cued Speech backgrounds. Charlier used pictures as stimuli to elicit rhyming judgments about pairs of pictures from deaf children from oral and cueing backgrounds. The rhyming pairs were presented in one of four conditions: orthographically similar (chaise; raise) or dissimilar (tasse-glace), and nonrhyming words had either similar speechread representations or did not. A striking result from that study was that subjects exposed to cued French, unlike orally educated deaf subjects, were misled neither by the pairs with speechreading similarity nor by the orthographically dissimilar pairs. Charlier concluded that rhyming abilities of deaf students exposed to a cued language
Research related to MCE systems. Research conducted during the past 20 years to investigate the effectiveness of MCE systems for developing English language abilities of deaf students has focused on either conversational (spoken or signed) or written English. The MCE systems researched most extensively include SEE I (Deal & Thornton, 1985; Gilman, Davis, & Raffin, 1980; Raffin, 1976; Raffin, Davis, & Gilman, 1978); SEE II (Babb, 1979; Gaustad, 1980; Gustason, 1988; Luetke-Stahlman, 1988; Mayer & Lowenbraun, 1990; Schick & Moeller, 1992); and Signed English (Bornstein & Saulnier, 1981; Bornstein et al., 1973–1984; Deal & Thornton, 1985).

Synthesizing the literature related to the effectiveness of MCE systems to develop deaf students’ English language abilities is neither a simple nor straightforward task. First, the various MCE systems differ substantially from one another; thus, it is difficult to generalize results of studies of one MCE system to the other systems. Second, measures used in studies investigating the effects of a particular MCE system on the development of English competence range from those of specific linguistic elements, including inflectional morphemes (Bornstein et al., 1980; Gaustad, 1986; Schick & Moeller, 1992; Schlesinger & Meadow, 1972) to those of more global aspects of language, including measures of reading comprehension (Babb, 1979; Brasel & Quigley, 1977; Deal & Thornton, 1985; Schick & Moeller, 1992; Wandel, 1989; Washburn, 1983). Third, characteristics of subjects (e.g., age, reading achievement, educational background of parents, and length of exposure to the sign systems) in the different studies related to a particular MCE system vary, thereby precluding a direct comparison of results across the studies, even when studies use similar measures. Fourth, the quality of MCE input afforded to subjects in the different studies, which is difficult to establish and control, is likely to be a confounding variable.

Drasgow and Paul conclude from their review of research related to MCE systems that, while it is possible to infer that some students exposed to MCE systems do reach a high level of English literacy, “most students are still not reading and writing on a level equal with their hearing peers, and many are still functionally illiterate” (1995, p. 84). Schick and Moeller conclude from their review of MCE research that
“While some aspects of English appear to be learnable via MCE systems, other aspects (e.g., English morphemes) might indeed be difficult to learn (1992, p. 337). Researchers’ hypotheses about why MCE systems have not resulted in higher achievement levels of deaf students during the past two decades might be classified as structural-limitation hypotheses or degraded-input hypotheses. Studies of how MCE systems are actually used, taken collectively, suggest that some or much of spoken English is deleted or incorrectly coded into sign by both MCE-using teachers (Baker, 1978; Erting, 1985; Geers, Moog, & Schick, 1984; Johnson & Erting, 1989; Kluwin, 1981; Luetke-Stahlman, 1988; Marmor & Petitto, 1979; Strong & Charlson, 1987; Woodward & Allen, 1988), as well as hearing mothers of deaf children (Swisher, 1985). Maxwell (1985) found that a majority of teachers have not been trained to use MCE systems proficiently because most university training programs provide only one to three sign courses. Baker (1978) relates the deletions and incorrect codings in terms of a cognitive overload, which involves simultaneously coding thoughts into two channels (i.e., auditory/oral and visual/gestural). Klima and Bellugi (1979) relate the deletions to temporal differences in the production rates in speaking and signing English. They theorize that hearing signers may strive to preserve their usual rate of speech, which may require the dropping of some signs that require more time to produce. Maxwell indicates there may be “psycholinguistic processing constraints on bimodal production,” and that “something has to give when one attempts to use both speech and sign simultaneously with such a large number of segmented units” (1990, p. 344). Maxwell, working primarily with deaf adults, disagrees with the view that simultaneous speaking and signing cannot convey the message. She reports that when messages conveyed via both speech and sign are analyzed at the semantic level, instead of the morphological or syntactic level, MCE systems do convey the message regardless of “gaps” at the morphological level.

Studies of the structure of MCE systems (Bellugi, Fischer, & Newkirk, 1979; Maxwell, 1983, 1987; Schick & Moeller, 1992; Supalla, 1990, 1991), taken collectively, suggest that the signed portion of MCE systems may not provide enough structured input for learners to use their human language-learning capabilities to learn English. The task of learning English via MCE systems would be similar to that of a hearing child trying to learn English in a (hypothetical) system that presents French or Japanese vocabulary in English word order with English prefixes and suffixes added to the French or Japanese words (Johnson & Liddell, personal communication, May 1997).

Recent research findings suggest that a major structural limitation of MCE systems for developing English language competence, including reading, relates to the inherent inability of MCE systems to convey English at the phonological level (Fleetwood & Metzger, 1991, 1998; Leybaert & Charlier, 1996). As noted earlier, phonological information about English is viewed as key to language development and reading. While the most basic unit of English conveyed by speakers and cuers of English is the phoneme, the most basic unit of English intended to be conveyed by MCE systems is the morpheme? A major disadvantage of MCE systems is that English is not conveyed at the phoneme level; thus, deaf individuals do not visually receive complete linguistic information about English.

Cued Speech

Description. Cued Speech, developed by Orin Cornett in 1966 and adapted to more than 56 languages and major dialects (Cornett, 1994), is neither a language nor an MCE system. It is a mode of communication for visually conveying traditionally spoken languages at the phonemic level (i.e., the same linguistic level conveyed via speech to hearing individuals or via signing of signed languages to deaf individuals).

The American English form of Cued Speech uses eight hand shapes corresponding to groups of consonants and four hand placements to convey vowels and diphthongs (see Figure 1). The different placements and handshapes, combined with nonmanual signals (e.g., mouth shapes), clearly distinguish the approximately 40 phonemes of English. For example, the bilabials /p/, /b/, /m/ are visually indistinguishable without voice for hearing individuals or without cues to the deaf individual; however, they are fully visible when cued.

Because Cued Speech distinguishes between and
were comparable to those of hearing children of the same age. During the following year, the boy continued to demonstrate receptive English competency comparable to that of a hearing native user of English; however, he spoke rather than cued expressively, few of his vocalizations were intelligible, and there were no attempts to combine words. Further, he produced no cues in isolation or coupled with his vocalizations. The parents then switched to an MCE system, where the child began to sign expressively, uttering sentences in English word order, and producing signs that slowly became more adult-like in their production. Nash's conclusion is that because cueing is a visual counterpart to the acoustic stream of consonant and vowel phonemes, it is difficult for a deaf child to distinguish one word from the next. However, Nash does not indicate how the process for cue-readers differs from the process in which deaf signers distinguish separate signs from the stream of a signed utterance or the process in which hearing children separate words from the stream of a spoken utterance. In addition, Nash does not clarify the extent the child's receptive cued English abilities or maturity affected his later expressive signing skills, nor the extent to which the subject gained English literacy.

Cornett (1973) refutes Nash's argument that young cuers cannot cue expressively. Cornett describes a pre-lingually, profoundly deaf subject with whom Cued Speech had been used from 8 months of age. This subject's receptive and expressive cued vocabulary progressed rapidly, so that at 2;0 years, the subject's expressive vocabulary was in excess of 300 words, and the subject was combining words to make two- and three-word utterances.

Mohay (1983) conducted a case study of three children, between the ages of 12 and 48 months, who had switched, at various ages, from an oral program to a Cued Speech program. The children's videotaped use of speech and gesture (and cues) over a period of two to three years was analyzed. Mohay found that the children's use of gestures decreased after they were exposed to cued English and that their spoken vocabulary and length of spoken utterances increased. She found also that two of the three children did not produce cued hand shapes or placements, although the third did begin to cue babble within the first 10 months of being exposed to cued English. Mohay's study does not indicate the potential effect of an oral background on the children's lack of expressive cueing; however, she concludes that Cued Speech does not aid spoken language development of deaf children. For perspective, in the earlier years of Cued Speech usage in the United States, many Cued Speech programs did not encourage children to cue expressively. It would be interesting to determine whether parents' and teachers' expectations played a role in the acquisition of expressive cued English. Further, a similar study conducted with deaf children from an MCE or ASL background might yield some important insights.

A more recent case study of expressive language abilities (Moseley, Scott-Williams, & Anthony, 1991) supports Cornett's 1973 findings. The subject for that study was 3;10 years, who had been identified at age 15 months with a severe-to-profound hearing loss, and had been fitted within three weeks with bilateral hearing aids. The child's parents learned to cue within 3 months. Three 15-minute videotapes of the child and different individuals (mother, father, teacher) were made during playtime. Orthographic transcriptions, along with contextual notes, were made of the utterances of each interaction and served as data for the analysis. The following aspects of the child's expressive language were analyzed from a language sample from the transcripts: (1) syntax/morphology: mean length of utterance, use of Brown's (1973) 14 morphemes, question and negation type; (2) semantics: lexical categories; (3) pragmatics: conversational acts (Dore, 1978), turn-taking, contingent responses; and (4) expressive cueing including strategies for use of expressive cues. Utterances were examined for presence of the above variables, and percentages of the total were calculated, where appropriate. The researchers found that the child's morphological development was within the normal range of children of similar age; use of lexical word classes and pragmatic conversational acts indicated a broad knowledge base in lexical meaning and pragmatic intentions; and clearly defined turn-taking and use of contingent responses indicated knowledge and use of discourse rules. Further, Cued Speech was used expressively to respond to requests, initiate statements and requests, and describe objects and events. The researchers concluded that the child demon-
strated aspects of syntax, semantics, and pragmatics demonstrated by hearing children of the same age. Particularly noteworthy was the knowledge of English morphology, frequently delayed in oral deaf children, which appeared to be within normal limits in the cueing subject.

Kipila (1985) conducted one of the few studies of Cued Speech in which both receptive and expressive language analyses focused on the cued linguistic form. Kipila’s subject, 5:4 years, had been exposed to English for three years. Kipila analyzed 111 videotaped utterances collected in an informal conversation with the child and found that the child was able to use the following morphemes with 100% accuracy: contractible auxiliary, past irregular, past regular, plural, possessive, third person irregular, and uncontractible copula. Omissions or errors related to articles, contractible copula, uncontractible auxiliary, present progressive, and third person regular. Metzger (1994b) added a longitudinal element to Kipila’s study by examining the same student six years later at 11:0 years. Metzger examined a total of six morphemes, specifically, three morphemes (i.e., past tense regular, past tense irregular, and plural) that Kipila had found the subject to use correctly 100% of the time and three morphemes (i.e., the contractible copula, present progressive, and articles) that Kipila had found the student to use correctly less than 100% of the time. Metzger found in the follow-up study that the three morphemes previously used correctly 100% by the subject were maintained, and the morphemes previously used with less than 100% accuracy were now used with 100% accuracy.

During the past decade, results of studies of deaf children exposed to a cued language, both at home and school or solely at school, suggest that English and other traditionally spoken languages (e.g., French, and Thai) can be conveyed as completely visually to deaf individuals via cueing as these languages are conveyed to hearing individuals via speaking. Recent studies of phonological abilities involving rhyming, speech-based codes in working memory, and phonics of deaf children who cue were described earlier in this article. Additional studies (Chilson, 1985; Clarke & Ling, 1976; Kaplan, 1974; Ling & Clarke, 1975; Neef, 1979; Nicholls, 1979; Nicholls & Ling, 1982; Nicholls-Musgrove, 1985; Perier et al., 1988; Quenin, 1992; Sneed, 1972) have focused on speechreading abilities of deaf cuers and the identification of written words encountered for the first time by deaf children.

Studies of speechreading abilities of deaf cuers have shown that while as little as 30% of syllables or words are accessible to deaf individuals via speechreading alone, 80%–90% of that same information is accessible when cues are added to speechreading of both alphabetic languages, including French and English (Clarke & Ling, 1976; Hage et al., 1990; Nicholls & Ling, 1982; Perier et al., 1988; Quenin, 1992), and tonal languages (Tammasaeng, 1985). These percentages of accessible information are comparable to those of hearing individuals when that material is received auditorily.

The findings that deaf individuals receive English more clearly and completely via cueing than speechreading has important theoretical implications for educating deaf individuals. It follows that if Cued Speech is clearly and completely conveys the phonological contrasts between the phonemes of the language, the deaf child will have the same access to basic linguistic (phonological) information that hearing children have. Further, deaf children who have clear, complete “cue-read” access to the phonology of the language, will have greater access to the vocabulary of the language. Numerous studies have established the link between vocabulary and reading comprehension of deaf students (Balu, Fulton, & Peploe, 1971; Davey & King, 1990; Davey, LaSasso, & Macready, 1983; LaSasso & Davey, 1987; Paul & Gustafson, 1991; Paul & O’Rourke, 1988). An advantage of having a cue-read vocabulary versus an MCE sign vocabulary is that the vocabulary will have a phonological component that, when combined with the graphic or orthographic component during reading, will enable the formation of a phonological assembly system that can be used to independently decipher, or decode, words previously unencountered in print. To the extent a reader can phonologically assemble words, the reader does not need to memorize sight words. An additional advantage of the phonological component (described earlier in this article) is that it assists in the storage of the surface structure of written text while that text is being processed.

Studies of the effect of Cued Speech on written word recognition by deaf cuers who encounter words
for the first time was examined by Alegria et al. (1990). Eighteen subjects, ranging in age from 8–13 years, who had at least two years’ exposure to Cued Speech as a teaching method, participated in the study. The experiment consisted of a pretest, a videotaped session, a posttest within 24 hours after the lesson, and a second pretest administered from 18 to 25 days after the pretest. Experimental words were divided into three groups based on topics (i.e., horseback riding, underwater diving, and fruits) and were represented by a drawing. An experimental session (i.e., “lesson”) consisted of showing subjects the drawings depicting the words from one of the three groups and the cued form of the words. The written form of the word was not presented. For each experimental word, a control word, similar in its orthographic (spelling) characteristics, was included for comparison. Control words were selected on the basis of their familiarity to the subjects. The posttests consisted of showing subjects the different drawings from the lesson, each of which was accompanied by four alternatives (the correct response and three distractors). The child’s task was to select one word from the three alternatives represented by the drawing. Distractors consisted of two homophones (one a real word, the other a pseudo-word) and an unrelated word. Correct responses were calculated for both the experimental (new) and control (familiar) words. Results indicated significant improvement between the pretest and both posttests in the experimental condition (but not with control words) with no decrease in performance between the first and second posttests. The authors concluded that the learning of new written words for deaf students exposed to Cued Speech was not limited to short-term learning but, instead, was sustained over time. Further, the fact that subjects ignored distractors that looked the same in a lipreading-only condition suggested that the internal representations of the words derived from Cued Speech enhances the decoding of written words encountered for the first time and can “prime the whole reading process” (p. 9).

In one of the few studies examining reading comprehension abilities of deaf children from different communication backgrounds, Wandel (1989) examined 120 deaf and hearing subjects from Oral, Total Communication, or Cued Speech backgrounds who were matched for hearing loss and years in the manual mode (signing or cueing). As noted earlier in this article, subjects in the hearing comparison group were matched with deaf subjects for age, general cognitive ability, gender, and parent educational level. One of Wandel’s measures was the Reading Comprehension subtest of the 1982 Stanford Achievement Test (SAT). Wandel found that, in comparison to their hearing peers, deaf subjects, as a group, attained significantly lower SAT reading comprehension scaled scores than hearing peers; however, reading comprehension scores of profoundly deaf subjects who used Cued Speech were higher than those of other groups of deaf subjects and comparable to those of the hearing comparison group.

Leybaert and Charlier (1996) conclude, from their review of recent studies related to phonological abilities of deaf individuals with cueing backgrounds, that deaf subjects exposed to a cued language both at home and at school are clearly advantaged in their use of phonological processes when compared to deaf children who are exposed to cueing only at school. According to Leybaert and Charlier (p. 246), deaf subjects exposed to a cued language, both at home and at school, appear to rely on phonological processes to the same extent as their hearing peers for rhyming, remembering, and spelling.

Theoretical Support for Cueing English

The major theoretical advantage of cueing English over signing MCE systems for conveying English is that Cued Speech conveys English at its most basic, that is, phonological, level while MCE systems are designed to convey English at the morphological level. Additional advantages of Cued Speech over MCE systems relate to task differences inherent in learning to sign or cue English and differences in the relative cognitive processing demands placed on the conveyor while conveying English.

Cueing conveys English more completely. Although MCE systems were designed to convey English syntax by combining ASL signs, English word order, and MCE-specific signs for inflectional endings, a number of studies suggest that MCE systems have limitations in helping deaf children internalize rules about English
phonological information, including prosodic information, to deaf individuals that is conveyed by speech to hearing people, thereby enabling the same morphological, syntactic, semantic, and pragmatic information to be received visually by deaf individuals as is received auditorially by hearing individuals.

Memory involved in learning to cue English vs learning to sign MCE systems. To the extent that memory affects the time and effort required to learn a language or mode of communication, clear task differences exist between learning MCE systems and Cued Speech. The task for new-to-signing parents learning MCE systems involves learning an extensive sign vocabulary to match the English vocabulary needed by preschool children. How many signs? Estimates of the receptive vocabulary of 6-year-old hearing children range as high as 25,000 words (Just & Carpenter, 1987), which is an average of 14 new words a day, from birth through age five (25,000 words/6 years with 365 days in a year). This can be a daunting task for those new-to-signing parents who do not have the resources to learn that many new signs a day.

The memory requirement involved in learning to distinguish and produce the different combinations of hand shapes and placements for the vowels and consonants in English is far less than that required to learn the different signs corresponding to the different words in English via an MCE system. Cuers of English, unlike MCE signers of English, do not need to learn an extensive new sign vocabulary corresponding to the English vocabulary. The task for cuers of American English is merely to learn eight hand shapes and four placements to represent the different American English phonemes (see Figure 1). Estimates of the time needed to learn to cue—that is, to learn to distinguish the cues for the 40-or-so phonemes as one learns to distinguish the keys on the keyboard in for typing—range from 10 hours to several weeks (Charlier, 1992; Cornett, 1990; Cornett & Daisey, 1992; Kipila & Williams-Scott, 1990), with fluency depending on the motivation of the cuer and, as with the typist, the amount of practice. While Cornett and Daisey indicate that it is not uncommon for adults immersed in a cueing environment to become fluent within 6 weeks, this is an area that needs research, as well as research to determine
how long it takes adults immersed in a MCE environment to become fluent users of that system.

Cognitive processing demands while cueing English or signing MCE systems. While the linguistic needs of the child are, by far, the most important considerations for parents in selecting between or among various options for conveying a traditionally spoken language, practical considerations are often a factor for parents in selecting a mode of communication. One practical consideration for some parents may be the cognitive processing requirements involved in the various options. New parents, who may be experiencing stress related to having an infant in the home, may find themselves particularly vulnerable to cognitive burden, or cognitive overload, if required to learn an extensive new MCE sign vocabulary while simultaneously trying to cope with a new infant. Cummins (1987) defines cognitive burden as the volume of information that must be processed in order to carry out the activity (1987, p. 63). Jankowski (1990) discusses the cognitive processing burden of signing English in the context of MCE systems; referring to the translation requirements of MCE systems, Jankowski notes that MCE users are required to constantly think about how to express ideas, as opposed to spontaneously conveying those ideas in a free-flowing manner (p. 57).

The cognitive processing requirements of a task include the number and type of decisions facing the conveyor of the language (Smith, 1997). Tasks requiring fewer decisions can be viewed as less cognitively-demanding than those requiring more decisions. For example, consider the relative difficulty of guessing a letter of the alphabet versus a word that someone has in mind. Clearly, the task of correctly guessing the letter of the alphabet is easier because of the chance factor. The chance of guessing the letter correctly is 1 in 26, while the chance of getting the word correctly is one in 50,000–100,000, based on estimates of hearing adults' vocabulary (Just & Carpenter, 1987).

Fluent signers of MCE systems face different decisions than fluent cuers of English. Processes involved in signing a signed language (e.g., ASL) or speaking or cueing a traditionally spoken language (e.g., English) can and typically do become fairly automatic; however, with MCE systems, because the sign vocabulary is adapted from one language to represent the vocabulary of another language, translation decisions are involved. For example, at the lexical level, the fluent MCE user needs to make translation decisions about which of several signs adapted from ASL is contextually appropriate for English words (e.g., right). By way of illustration, in SEE II (Gustason, Pfeitzing, & Zawolkow, 1972), different signs would be used for signing the following sentences: Turn right into the parking lot. You are right, of course. or It is my right to be here. Additional decisions that MCE users need to make relate to those English words for which the signer knows no sign or cannot recall a sign—in which case, the signer needs to mentally search his or her sign lexicon and select that which comes closest in meaning to the English word. The cue of right would cue the word based on its pronunciation, regardless of context. Other translation decisions that fluent MCE signers need to make relate to metacognitive decisions about the degree of translation specificity desired by the receiver, including whether to use a generalized sign, such as candy for fudge or caramels, bug for insect, or meat for steak or pork chop. The cue of English would not face these decisions.

The fluent cue of English and the fluent signer of ASL, unlike the fluent signer of MCE systems, are not concerned with translating between two languages; thus, they have fewer lexical decisions to make than MCE signers, who have translation decisions. Cuers of English and other traditionally spoken languages are concerned solely with conveying the consonant-vowel phoneme-equivalents plus prosodic information accompanying the phonological information. The cue would cue right the same way, regardless of its meaning and leave it to the deaf individual to determine its meaning, in the same way that hearing individuals determine the meaning of such words.

In theory, the fluent cue of English, who faces fewer lexical decisions than the fluent signer of MCE systems, has more residual energy to concentrate on the pragmatic, semantic, and syntactic aspects of communication. It can be speculated that the relative energy drain related to signing English may result in reduced linguistic interactions between the MCE-signing parent and deaf child, thereby resulting in fewer opportunities for the deaf child to generalize the
rules of English. It can be further speculated that the energy drain resulting from the translation requirements of signing MCE systems may be an additional explanation for the observation (Bornstein, 1990) that some hearing parents and teachers drop some signs while signing English.

The fact that cueing does not involve translation decisions may be one explanation for the view that cued English, once learned, becomes as automatic as speaking English or signing ASL (Cornett & Daisey, 1992). In fact, for new-to-cueing hearing parents, learning to cue English has been compared to learning to type English; that is, once the keyboard has been learned, the typist need only to type to gain fluency. Similarly, once the cuer learns the eight hand shapes and four placements, the cuer needs only to cue to gain fluency. The only decisions a cuer needs to make, besides those described above, are metalinguistic decisions related to whether a phoneme has been cued correctly or whether the receiver of cues can see the cues. Similar metacognitive decisions need to be made by MCE signers of English; however, MCE users, unlike cuers, must constantly be aware of the contextual appropriateness of the sign selected to represent the English word as well as the need of the receiver for specificity of the vocabulary. This can be a daunting task for an adult and even more daunting for a young deaf child without the cognitive abilities of adult MCE users.

Conclusion

Preparing any preschool child to acquire second or third languages and English literacy in bilingual programs is neither a simple nor straightforward task. Parents, regardless of whether they are hearing or deaf or whether their children are hearing or deaf, are likely to face pressures related to parenting and have questions about good parenting as well as about how to prepare the deaf child for instructional programs to maximize the child's academic potential. These pressures and questions can be especially complex or daunting for hearing, nonsigning parents of deaf children who share the goals of BiBi education but who elect for their home language to be L1 for their deaf child.

In this article we have discussed the view that there are multiple routes to the preparation of deaf children, during the preschool years, to achieve the goals of BiBi programs, including English literacy. While it has been demonstrated that nonsigning, hearing parents can be successful in developing ASL as L1 with appropriate resources and support (Erting, 1992); at this point in time, many parents do not have those resources and are, for a variety of reasons, electing for their home language to be L1 for their deaf child. Thus, the focus of this article has not been on which language should be L1 for deaf children but, instead, has been on those factors nonsigning, hearing parents, who choose for their home language to be L1, might want to consider in selecting a mode for conveying traditionally spoken home languages, in a way that maximizes language accessibility and the deaf child's opportunity to naturally acquire that language.

We have emphasized here that language access, not the nature (signed versus traditionally spoken) of language per se, is the critical issue needing to be addressed in order to significantly improve reading achievement scores of deaf students. We have provided a theoretical perspective, as well as research, to support the conclusion that cueing can and does convey traditionally spoken languages clearly and completely to deaf children, and we have discussed the practical advantages of cueing English over signing MCE systems.

It is important to note that while Cued Speech can be an important tool to be used by deaf children in acquiring English language competence, cueing, in and of itself, cannot address all of the communication needs of the deaf child. As with any mode of communication, Cued Speech is only as effective as its users and the child's total linguistic environment.

In this article, we have discussed research findings supporting "structural limitation hypotheses" related to MCE systems for conveying English as well as "degraded-input hypotheses." It is important to note, however, that while MCE systems may not have been effective for all deaf children, they clearly have been effective for some deaf children. Additional research is needed to determine for whom and in what circumstances MCE systems are effective. In addition, although research exists to support that deaf children exposed to cued language can and do develop abilities related to English, including rhyming, phonological recoding, and phonics, all of which affect reading achievement, it is important to note that Cued Speech has not been effective for some deaf children. As with
MCE systems, additional research is needed to determine for whom and in what circumstances Cued Speech is effective for deaf children.

Research regarding MCE systems should continue to explore the structure and use of MCE systems. Similarly, specific research questions related to Cued Speech should focus on the same questions. Specifically, research related to Cued Speech is needed to gain a deeper understanding of what happens structurally with cuing as well as how cues vary in their cuing. In terms of gaining a greater understanding of what happens structurally with cuing, the following are fruitful areas for continued inquiry. Which elements of cuing (placement, hand shape, mouthing, etc.) are essential for distinguishing a particular cue from all others? Does voicing enhance or detract from cues distinguishing between phonemes? How do cueing and speaking compare phonetically and phonemically? What is the relationship between the manual vs. nonmanual component of cues? How do the prosodic elements of spoken English compare to the prosodic elements of cued English? Besides head movement, what additional nonmanual signals (e.g., eyebrow movements) convey prosodic information? How does English rhyme visually when cue-read vs. when speechread?

Fruitful areas of inquiry related to use of Cued Speech can be divided into issues related to language acquisition and the development of literacy, parent-child interaction, variation between or among cuers, differences between learning to cue a language one already knows or learning a language via cuing, and how cued languages can be incorporated into different BiBi models. Related to language and literacy acquisition, research is needed to answer the following questions: Are findings from earlier language acquisition case studies of deaf cuers (Cornett, 1973; Kipila, 1985; Mohay, 1983; Moseley et al., 1991; Nash, 1973) confirmed in studies of adult deaf native cuers? Are findings of MCE studies, which have investigated language and reading achievement with deaf students, similar when conducted with students exposed to Cued Speech? Are Wandel's findings related to reading achievement of deaf cuers supported with larger numbers of deaf subjects and subjects who vary in terms of age, socioeconomic backgrounds, and other factors? Developmentally, at what age are the different components (e.g., hand shape) of cued language comprehended and used by deaf children? Which cues are acquired first? Which components of cuing are acquired first? How does the acquisition of such features as hand shape, location, and movement in signed languages compare with the acquisition of such features (e.g., hand shape, location, movement, etc.) in cued languages? What types of feedback (i.e., tactile-kinesthetic or visual) systems are used by deaf cuers during phonological recoding and phonics?

Questions related to parent-child interactions include the following: Do deaf cuers imitate the cues that they have seen or do they generate something different? What differences are there between hearing and deaf mothers cueing to their deaf babies?

Studies exploring variation among cuers should address the following: What, if anything, differs in how native cuers cue than how nonnative cuers cue? If there are differences, what is the significance? How much variation exists in cued English? What accounts for the variation?

Research needed to confirm differences between learning to cue a language one already knows or learning a language via cuing needs to address the following questions: What is the difference between learning to cue a language one knows versus learning a new language via cuing? For hearing, nonnative cuers, to what extent do variables such as auditory training, phonics instruction, and motor dexterity affect the learning of cues and development of fluency?

Finally, research is needed to determine how cued languages can be incorporated into different BiBi models. Specifically, what are the optimal ways to combine cued languages and signed ASL in BiBi programs to enable deaf children to become truly bi- or multilingual? Answers to these questions and others posed in this article will provide needed insight into maximizing opportunities during the preschool years for preparing deaf children to reach the goals of BiBi programs.

Notes

1. We refer to English, Spanish, etc., as traditionally spoken languages in this article because speech is not a requirement when Cued Speech is used (Beaupre, 1986; Cornett, 1973; Fleetwood & Metzger, 1998, Metzger, 1994).
2. As Beaupre (1986) and Fleetwood and Metzger (1997, 1998) point out, Cued Speech provides phonological information about the consonant and vowel phonemic elements of a language, but not about the phonetic attributes about speech (e.g., nasaliza-


should be affirmative. *Journal of Deaf Studies and Deaf Education*, 2, 277–279.


Raffin, M., Davis, J., & Gilman, L. (1978). Comprehension of inflectional morphemes by deaf children exposed to a visual...