

**Looking Beyond the Obvious:  
Assessing and Understanding Deaf Learners**

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Obviously, the issue of assessment is an important one. When it relates to children who are deaf and hard-of-hearing, the issue is at once both more complex and even more important.

Perhaps the greatest challenge in assessing the skills of deaf learners — whether in school testing, clinical assessment, or research — is ensuring that language is not a barrier. When potential communication problems are eliminated, most assessments (and assessors) assume that deaf and hearing children are much the same. It is often overlooked that the background, experiences, and knowledge of deaf students may not be the same as that of hearing students, regardless of the language or mode of communication they use. In order to fully understand the characteristics of deaf learners, including both strengths and weaknesses, it is necessary to understand the interactions of cognitive, social, and linguistic factors in the environment. Without that information, we cannot provide fair assessments of deaf students and thus we cannot educate them appropriately. This chapter argues that there are real, qualitative and quantitative differences between deaf and hearing children that can influence learning, both positively and negatively. Such differences need to be identified and utilized in developing teaching techniques appropriate for children who are deaf or hard of hearing. Ignoring such differences helps no one.

A brief anecdote will help to indicate the breadth of the discussion that I think must occur. I have been working with a school for the deaf in the United States on ways to deal with

new mandatory testing requirements in their state. As in some other countries, mandatory competency testing is now becoming common in the United States, although it is being done on a state-by-state basis rather than nationally. This particular school, like other schools for the deaf, is struggling with ways to prepare their students for tests that were designed for hearing students, who generally have better language and literacy skills. Notice that this is separate from the larger issue of educating deaf students appropriately so that they are ready for such tests. The issue here is how to ensure that tests really measure what children know.

Schools like this one also struggle with ways to explain the results of their testing to school officials and parents, because test scores often are published in local newspapers along with scores from the all other public and private schools in the area. Without an opportunity to explain that the test might not be a fair assessment of deaf children's competencies (Marschark & Lukomski, 2001), that a significant number of children at a particular school may be from disadvantaged backgrounds, or that a proportion of the students may have various learning disabilities or physical handicaps, poor scores will be taken as an indicator that a school is failing. Parents may decide not to send their children to that school or may withdraw the ones who are already there. The result will be fewer resources going to those schools and an acceleration of the downward spiral that began with the move toward inclusion and mainstreaming in the United States during the 1970s. In the end, situations like this could result in schools for the deaf having to close their doors.

There is a bright side to this story, at least in the case of the school I have been working with. Rather than trying to find excuses for test performance that was lower than was expected, this school is looking at the needs of its students and reconsidering the way in which deaf children are taught — and teachers are trained. These initiatives must go hand-in-hand, because we now know much more about the development and education of deaf children than we knew 5 or 10 years ago when most of these teachers were students themselves. In addition, this school and others are looking to research and researchers to assist them in finding the best ways to assess deaf children — to identify their weaknesses and determine how to build on their strengths.

An undertaking of this sort is not a simple matter, it requires that we re-examine some of our assumptions and approaches with regard to deaf children and the educational process. This is an area that I have been very concerned with for several years as an educational administrator, as a researcher, and as someone who teaches deaf students myself. Given my own research interests, my focus has been on the ways that deaf children learn about the world, what they know about it, and how their knowledge influences their academic achievement and other behavior from a cognitive-developmental perspective. My approach to these issues has been well captured by two other investigators who were examining special education more broadly. They noted that

...lack of understanding of the cognitive skills underlying educational interventions is the fundamental problem in the development of special education. Without understanding the full complexity of cognitive abilities, special educational methods can never be special (Detterman & Thompson, 1997, p. 1083).

This statement captures one of the two assumptions that underlie my approach to the assessment of deaf children's abilities and academic skills. I believe this point must be at the heart of any attempts at assessing various characteristics of deaf children and translating what we learn into practice (see Marschark, Lang, & Albertini, in press).

The other assumption that I make is one that we know to be true, but one that is often avoided for all of the *wrong* reasons. That is, it is often argued, usually out of a sense of equality but sometimes for the purposes of political correctness, that deaf children are just like hearing children (e.g., Seal, 1998). In many ways, of course, they are. But for the purposes of assessment and education, treating deaf children as though they are simply hearing children who cannot hear denies them their unique experiences, their language, and their culture. Regardless of whether they have deaf or hearing parents or are part of a Deaf community, deaf children have somewhat different childhoods than hearing children. While some of the differences are superficial and likely of no long-term importance, other differences make deaf children “who they are.” That means we must understand and take those differences into account when we develop and administer assessments and when we seek to educate them inside or outside of the classroom. To do anything else is to deny deaf children equal opportunity.

### **Recognizing Differences between Deaf and Hearing Children**

Let us consider some of the ways in which deaf and hearing children appear to be different, at least according to recent research. It is essential to keep in mind here that the goal in describing differences between deaf and hearing children is not to suggest that one characteristic is good and one characteristic is bad. Rather, the point is to demonstrate ways in which we must be sensitive to the needs of deaf children.

#### *The Deaf Child in Context*

Consider, first, parental acceptance of a deaf child. It is often noted that more than 90 percent of deaf children have hearing parents. We also know that it is difficult for parents whose child differs in some way from what is considered “normal” to accept the child and their disability. A variety of investigators have done work in this area, explaining how most parents finally come to overcome their initial emotions and accept their disabled child. For the present purposes, the important point is that hearing parents’ adjustment to having a deaf child, accepting their hearing loss, and determining how the whole family will deal with it can delay the development of normal parent-child relationships from a few months to a few years. During this time, various aspects of social, language, and cognitive development may differ from that of hearing children. Even when the differences are small, they still may be significant.

Just as the causes and characteristics of childhood deafness vary widely, so do the early experiences of deaf children and the abilities of parents and families to adapt to the changes that accompany having a deaf child. These changes are not always dramatic and need not be traumatic for either parents or the children themselves. Nevertheless, parental acceptance of children's hearing losses and adjustment to their needs are essential for a normal childhood. Attention to those needs acknowledges that deaf children may be different from hearing peers. By recognizing that deaf children vary greatly — just like hearing children — we are able to treat them as individuals instead of looking for an elusive one-size-fits-all approach (Detterman & Thompson, 1997).

In this regard, it is noteworthy that deaf children from deaf families generally will experience greater understanding and acceptance from their parents and others in the Deaf community relative to deaf children from hearing families. Deaf children with deaf parents are likely to have had a wider range of social interactions and informal educational experiences

within different (deaf) adults, and they are more likely than deaf children with hearing parents to have experienced consistent parenting behaviors and effective communication from an early age. Interactions with deaf individuals outside of the immediate family thus are more likely to be similar to those within the family. Partly as a result of this consistency, deaf children of deaf families tend to have relatively greater self-esteem and a greater sense of being in control of their own lives, factors that will contribute to later academic achievement. Deaf children of hearing parents can be just as confident and secure as those of deaf parents, of course, but it may require more conscious planning by hearing parents to ensure that their children have the right kind of personality-building experiences (see Marschark, Lang, & Albertini, in press, Chapter 4).

### *Communication and Language*

One way in which deaf and hearing children clearly differ is in the availability of “effective communication” alluded to above. Deaf children who have hearing parents frequently do not have full (if any) access to language during the first 1-3 years of life, the years that are most critical to language learning. This disadvantage has an impact in a variety of other areas. Included among these is the quality and quantity of the child’s cognitive and socially-relevant experience. We know that interactions with other or adults, activities outside of the home, and effective communication are keys to normal language development as well as social and cognitive development. If parents are unable to provide their children with informal educational experiences and engage in day-to-day conversation with them, language and other aspects of normal development, will at least be different — regardless of whether their children are deaf or hearing. It thus is essential that parents discover or are taught ways to communicate visually with their deaf children.

By “visual” here, I do not only mean via sign language. At some point, parents and their deaf children may find that spoken communication is possible and/or preferable to sign language. But many parents delay making sign language available to deaf children in the hope that their child will be able to function entirely in a spoken language mode. Many, if not most, deaf children will not be able to do so; but even those children who can use spoken language still depend greatly on visual information to support speechreading. Sensitivity to children’s visual communication needs is thus essential, regardless of the mode of communication. And, at least as far as we can tell from existing research, most if not all deaf children can benefit from exposure to sign language even if they will eventually use spoken language and even if they have a cochlear implant (Marschark, in press).

While hearing parents may have difficulty adjusting to communication with their deaf children, deaf parents have shown us a variety of normal and effective ways to communicate with deaf children. In order to get and keep a child’s attention, deaf parents use exaggerated facial expression and body language to appear more interesting to children. In spoken language this is referred to as “motherese.” Deaf parents move their hands or whole body into the child’s field of view or touch them to get their attention, where hearing parents often forget to do so. Deaf parents also point to interesting things in the environment and look at them themselves, eventually drawing children’s attention to those things. Notice that in addition to simply gaining a child’s attention, these strategies foster an understanding of the importance of some parental actions over others and some objects over others. They also establish a framework for communication and social interaction (Spencer, Bodner-Johnson, & Gutfreund, 1992).

Once they have gained a child’s attention, deaf parents facilitate communication, and at

the same time foster language and cognitive development, through a variety of similar strategies. When they point to an interesting thing, they name it, and frequently point at it again, thus helping to connect the name with the thing. They do not begin a signed utterance until the child is actually paying attention (something difficult for hearing parents to adjust to), so that the child does not have to switch attention back and forth. Deaf parents slow the rate of communication relative to hearing parents, allowing their children more time to understand messages, and they use shorter utterances. As with pointing, deaf parents also put important or new information at both the beginning and the end of an utterance, ensuring that a child understands the topic of discussion (Mohay, Milton, Hindmarsh, & Ganley, 1998). Importantly, these are not just factors of importance to parents, but essential aspects of communication for anyone involved in caring for, teaching, or evaluating deaf children.

Taken together, these visually-based strategies do more than just gain attention and support communication: they form the basis for learning and development in other domains. A number of early intervention programs thus are starting to incorporate training for (hearing) parents in such techniques. Generally, children who are enrolled in early intervention programs have effective communication and affective bonds with their mothers, and who use sign language tend to show the greatest gains in development and early academic success (Calderon & Greenberg, 1997). While deaf parents' intuitive parenting strategies may be particularly supportive in these domains, with appropriate intervention, hearing parents can do this just as well as deaf parents.

### *Attention*

Another obvious difference between deaf and hearing children has recently gained recognition as worth investigating, albeit in a way distinct from what might be expected: the availability of auditory information. The development of visual attention skills is clearly important for deaf children. Discussions of visual attention in hearing children usually include the role played by auditory information, and there now some evidence that there must be some consideration of its contribution for hard of hearing and some "deaf" individuals as well.

A variety of studies have shown that the developmental pattern of visual attention among young deaf and hearing children is very similar. We know, for example, that parents (deaf or hearing) who use more visual communication with their (deaf or hearing) children are more likely to have children who are better at maintaining joint visual attention with them (Spencer, 2000). At the same time, auditory information — both elaborating about an object of attention and reinforcing the child for attending to it — appears to encourage hearing children to attend to those objects longer. Unlike hearing children, who can attend to an object visually while attending to parental language auditorally, deaf children have to switch their attention between an object of interest and the person who is communicating about the object. That switching clearly has an impact on both the amount of information that might be communicated and the time available to engage in visual exploration. It also affects a child's interest in objects and communication as well as their willingness to attend to those who interrupt them (Harris, Clibbens, Chasin, & Tibbitts, 1989).

At least at preschool age, both deaf and hearing children appear to be equally good at maintaining visual attention (Waxman & Spencer, 1997; but see Spencer, 2000, for variation as a function of communication strategies of deaf and hearing mothers). By age 6, however, deaf children tend to be more prone to visual distraction than hearing children (e.g., Quittner, Smith,

Osberger, Mitchell, & Katz, 1994). Quittner et al. (1994) showed quite clearly that residual hearing and use of hearing aids can support visual attention in children 6-8 years old. For older children, 9-13 years old, cochlear implants were found to be even better.

Note that the issue here is not about a link between cochlear implants and language, at least not directly. The point is that auditory information supports visual attention and thus social interaction and learning in general. Specifically, young children's experience in "triangulating" between an object, adults who identify or label things in the environment, and themselves appears to play an important part in the development of visual attention and, probably, in early vocabulary (Spencer, 2000). The ability to make use of auditory cues is not an essential factor in either of these, but it clearly is a supporting factor.

### *Visual-Spatial Processing*

Given that deaf children's learning depends primarily on visual information, it is important to recognize differences between them and their hearing age-mates — in both directions — in the domain of visual-spatial processing. Deaf individuals, for example, tend to be faster than hearing individuals in redirecting visual attention from one spatial location to another (Parasnis & Samar, 1985) and in their ability to detect motion in the periphery, especially when that if motion is language-relevant (Swisher, 1993). They also have an advantage in their perception and memory for complex visual signs, in face discrimination (Bettger, Emmorey, McCullough, & Bellugi, 1997), and in the ability to generate and either transform or rotate mental images (Emmorey, 1998).

The extensive literature on the generation and manipulation of mental images may be unfamiliar to many educators, so let me explain briefly. Imagine that you are standing in front of the Eiffel Tower looking toward it. When you have a good visual image of it, make the tower rise off the ground and rotate its base away from you, so that the television antenna on the top comes down to point directly at you. Not everyone can do this kind of generation and rotation, but most people can with some degree of clarity. Assuming that you were able to do so, what do you see? It should look like something approximating a large letter "X," and there is no other way to discern the result other than "visually." The chances are that if you are deaf, this task was easier (or faster) for you than if you are hearing. This does not mean that deaf people are uniformly better than hearing people in visual imagery. But exposure to sign language appears to result in a neuropsychological organization that has advantages in some domains (Bettger et al., 1997; Emmorey, 1998), and this is one of them.

The same holds for face recognition. Bettger et al. (1997) showed that adults and children who were native users of sign language showed enhanced ability to discriminate and recognize novel faces relative to hearing peers. The two groups were essentially equivalent, however, in their ability to recognize faces that were seen in a rotated position, indicating that there is something special about faces (in their canonical form) for people who depend on them for grammatical information. So this is not just a general advantage held by deaf individuals. It requires a specific kind of experience — one that most hearing people do not have. In fact, such findings appear only to hold for people raised using sign language. These limitations indicate that the differences observed between deaf and hearing individuals do not reflect any simple *sensory compensation* as a result of hearing loss (Bettger et al., 1997; Parasnis, Samar, Bettger, & Sathe, 1996). The causes and effects of such differences are much more specific.

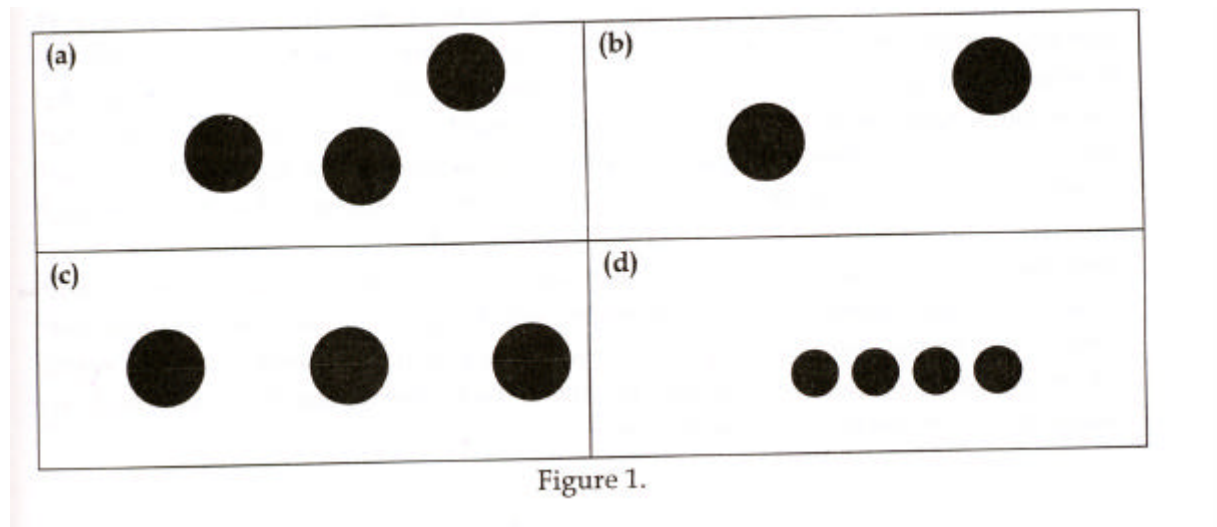
### *Memory*

A finding related to those in visual-spatial processing is that deaf and hearing individuals usually perform similarly in tasks requiring memory for pictures and objects as assessed by free recall, but hearing people are generally better than deaf people in their memory for visual material when assessed by serial recall (Todman & Seedhouse, 1994; see Marschark & Mayer, 1998, for a review). The finding that deaf individuals typically have shorter serial recall or *memory spans* than hearing individuals has been replicated many times in the past 80 years (e.g., Pintner & Patterson, 1917). Deaf individuals who use sign language also have been found to have shorter memory spans than deaf individuals who use spoken language (Lichtenstein, 1998). It used to be believed that these differences indicated that deaf people have less memory capacity than hearing people. We now know that the result actually is an artifact, an accident of the fact that signs take up more space in working memory than words. This is because individual signs take more time to produce than individual words, and working memory is time-based, that is, limited approximately to the amount they can be articulated (by mouth or by hand) in two seconds (Marschark, 1996; Wilson & Emmorey, 1997). When we control for the time required to produce signs and spoken words, we see that deaf and hearing people have exactly the same memory capacities. Nevertheless, anyone who is doing assessments with deaf children and anyone who is teaching deaf children must be aware of the fact that rote memory tasks (that is, memorizing a list) is likely to be more effortful for children who use sign language than children who use spoken language.

### *Relations and Item-Specific Information*

Beyond differences in visual attention, visual spatial skills, and working memory, there are other differences between deaf and hearing learners that we still do not understand fully. One that appears to be particularly important for issues of assessment relates to the number of dimensions involved in a task. To give a simple example, deciding whether panel (a) or panel (b) in Figure 1 has “more” involves only a simple judgment of relative numerosity, and even preschool children are able to respond appropriately. In deciding whether panel (c) or panel (d) has “more,” in contrast, young children also take into consideration number, size, and length of the arrays — sometimes making errors — even if the latter two dimensions are irrelevant.

*Figure 1.*



More generally, across a variety of different tasks (although likely not in one this easy), we find that when only a single dimension is involved, deaf and hearing individuals perform at comparable levels. As can be seen in Figure 2, however, when two or more dimensions are involved, performance is quite different, and in most cases hearing individuals perform at higher levels (Ottem, 1980). This apparent difficulty with tasks involving multiple dimensions that must be considered simultaneously may be related to visual attention – with irrelevant dimensions being distracting – or may be related to working memory – where additional variables may take up added space if they are mentally labeled. Or, it could be related to something else altogether. In any case, this clearly is something we need to take into account if we are to be able to conduct valid assessments and design our teaching strategies appropriately (see Marschark et al., in press, Chapter 9, for discussion).

51 studies of discrimination, rule learning, conservation, classification, etc.	One dimension	Two dimensions
How often deaf and hearing show similar performance	<b>49 (85%)</b>	<b>6</b>
How often deaf and hearing show different performance	<b>9</b>	<b>29 (83%)</b>

Figure 2. Based on Ottem (1980).

A related area in which we find differences between deaf and hearing learners is known

as *item-specific* versus *relational* processing (e.g., Huffman & Marschark, 1995). Item-specific processing entails dealing with a word, picture, or idea in isolation; whereas relational processing entails associating it with other, known information. Relational processing can be either automatic or intentional. Good readers do it automatically, using their linguistic and content knowledge to make inferences and does improve comprehension (Oakhill & Cain, 2000). Understanding each word in a sentence is influenced both by the words that come before it and our knowledge of what is being written about, as well as by the meaning or meanings of the word itself. Reading would not be very fluent if each word was treated as a separate item.

Yet, it appears that deaf learners often adopt an item-specific approach to information processing rather than a relational approach. When reading, for example, deaf children tend to focus on relatively limited sections of text, or “local context” rather than focusing on the relations of ideas to the entire text (Banks, Gray, & Fyfe, 1990). As a result, they may comprehend and remember less of the text than hearing peers or remember only disconnected fragments of what they have read. The latter situation, demonstrated by Banks et al. (1990), is interesting. In their study, deaf children remembered just as much as hearing students, overall, even though they were using the much more difficult item-specific strategy. This means that in some real sense, their memories for the stories they read were quantitatively better than those of hearing children, even though they were qualitatively worse (i.e., remembering fragments rather than related phrases).

Similar results were obtained in a variety of memory studies conducted with deaf and hearing children during the 1970s, as indicated by the fact that in recall, deaf children did not cluster or group together words that were related in their meanings even when overall recall performance was comparable (e.g., Liben, 1979). And deaf college students have been found to remember more about a classroom lecture when they read a transcript of the lecture rather than if it was interpreted for them (Stinson & McLeod, 1980). Presumably, having the transcript in front of them helped to support relational processing, as they could go back to previous information and connect various concepts presented on the same page. Another recent investigation involving college students, however, found that deaf students reported significantly more difficulty in inter-relating concepts in material they had studied, relative to hearing classmates (Richardson, McLeod-Gallinger, McKee, & Long, 1999).

Still to be determined is whether or not such difficulties are related to academic performance, or whether it simply means that deaf students have to study harder or longer than hearing peers in order to achieve the same grades. A similar issue could be raised with respect to findings obtained by Marschark, De Beni, Polazzo, and Cornoldi (1993). They found that after reading a text, deaf adolescents tended to remember more individual words from a printed passage relative to hearing children who were matched either for age or reading ability. In contrast, both groups of hearing children tended to remember relations among words. Although it appears obvious that such differential strategies would influence comprehension, measures of comprehension and memory appear not to have been directly linked in such studies.

Taken together, and especially in light of deaf students’ demonstrated difficulty with serial memory, these results emphasize the importance of encouraging deaf students to seek relations among words and ideas. In order to understand interpersonal communication, text, or events happening around us, we have to relate new information to existing knowledge. Certainly, most of our assessment tools assume that this happens automatically, but existing research suggests that it may be more automatic in hearing students than in deaf students.

Before leaving the topic, it should be pointed out that this tendency toward item-specific rather than relational processing may also be at the heart of the apparent difficulty of deaf students in dealing with multiple stimulus dimensions at the same time. Focusing on individual items or on a single dimension of a complex stimulus rather than looking for the “big picture” alternately may be a function of the way that we teach deaf children. All too often, teachers are willing to settle for less from deaf students than they would from hearing students, and are content if deaf students simply understand the primary point, the most obvious meaning, or identify one component of a complicated situation (Marschark, 2000). While, in some sense, this might be intended as helpful, it clearly is harmful in the long run, giving students an inappropriate strategy for learning and not holding them to a high enough standard.

### **Where Do We Go From Here?**

All of the research described above converges on three general conclusions. First, it is essential that we keep in mind that deaf and hearing children may have different knowledge, cognitive strategies, and experiences. In some cases, their differing backgrounds will have significant implications for the teaching-learning endeavor and for assessment in a variety of domains. If we do not understand those differences, we cannot obtain fair and accurate evaluations of what deaf children know. Certainly, in that case, we cannot educate them fully.

Second, what this means is, quite simply, that deaf children are not “hearing students who cannot hear.” We can understand the sentiment of some people to say that deaf and hearing children are the same. However, it is usually hearing people that say that. Most deaf people want to be understood and recognized for who they are. To claim that deaf and hearing children are the same is a gross oversimplification that might be politically attractive but can be educationally disastrous.

Third, the studies described above, and many that I have not included here, indicate that we need to re-examine our assumptions, conclusions, and approaches — in both research and education — if we really want to understand and optimize educational opportunities for individuals who are deaf or hard-of-hearing. The purpose of conducting assessment research and educational research, is to understand how our methods work, to ensure that they are valid and reliable, and to improve them. If we do not really understand the individuals with whom we are working it is impossible to provide fair and appropriate evaluations of what they know or develop teaching strategies to help them learn more.

In many ways, we already are doing a good job of educating deaf children. But we have the knowledge and we have the tools available to do even better. At least from my perspective, the preceding discussion and others like it in this volume should leave us optimistic and motivated rather than disillusioned. This is a point that, I believe, Madame Josette Chalude has articulated well: We must identify *real* differences between deaf hearing children and use this knowledge to improve our educational methods. Simply finding such differences is a little use unless we actually apply what we have learned. For this reason, the consistency that we now see across investigations — especially when they tie together investigations from different domains — bodes well for progress in the future.

Just 40 years ago we did not realize that deaf students who signed rather than spoke “had language” (Furth 1966; cf. Stokoe, 2001). Twenty years ago, we did not know that deaf readers could acquire the phonological skills that are apparently necessary for skilled reading (Conrad 1979; cf. Leybaert, 1993). And, just 10 years ago we did not know that reading would require

more memory capacity if text was mentally represented in sign language than in spoken language (Waters & Doehring 1990; cf. Marschark, 1996; Wilson & Emmorey, 1997). Although none of these findings, in and of themselves, tell us how to improve the reading abilities of deaf children, they are all central to understanding the challenges faced by young deaf readers. Further, they have fundamentally changed the ways we go about educating deaf children — or they should (Marschark et al., in press; Marschark & Lukomski, 2001).

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