

# Acquisition of English Literacy by Signing Deaf Children

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## Abstract

Research on how signing deaf children learn to read and write provides no clear answer to how successful deaf readers acquire literacy in a spoken and written language. Providing early support and deaf-centered environments may prevent delays in the development of language and literacy. The study of strategies used by deaf adults that explicitly link signs to print is critical. Also important are the consideration of the role that Manually Coded English and phonological awareness may play in the development of English literacy. The research indicates that there are multiple paths, rather than a single one, to reading for deaf learners.

## Key words

Deafness in children - Education. Deafness in children-language. Deafness in children in children - writing.

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## **Letramento em inglês de crianças surdas sinalizantes**

### Resumo

Pesquisas sobre como crianças surdas sinalizantes aprendem a ler e escrever não apresentam respostas claras sobre como atingir o sucesso dos leitores surdos na aquisição do letramento na língua falada e escrita. Oferecendo apoio e um ambiente centrado no surdo pode evitar atrasos no desenvolvimento da linguagem e do letramento. O estudo das estratégias usadas pelos surdos que explicitamente relacionam os sinais com a grafia é crítico. Também são importantes as considerações sobre o papel do Inglês Manualmente Codificado e da consciência fonológica que podem ser relevantes no desenvolvimento do letramento no inglês. As pesquisas indicam que há múltiplos caminhos, ao invés de um único só, para o acesso a leitura por aprendizes surdos.

### Palavras chave

Crianças surdas - Educação. Crianças surdas- Linguagem. Crianças surdas - Escrita.

## **Overview**

This article<sup>1</sup> describes the current state of knowledge on how signing deaf children learn to read and write English. Approaching the task of describing the acquisition of English literacy by signing deaf children is extremely complex. Waters and Doehring point out that “no coherent picture of the reading skills of the deaf has emerged” (1990, p. 336) despite numerous studies, and that interpreting the research base is challenging due to the variations in deaf subjects such as age, communication mode used, parental hearing status, and age the subject acquired their first language or may focus on only one particular aspect of reading such as word recognition.

English literacy is a challenge for deaf students. For much of the 20<sup>th</sup> century, numerous studies on reading and deafness sought to understand how to overcome the low literacy outcomes that most deaf students realize. Traditionally, much of the effort of deaf education has focused on the development of language. Language acquisition and literacy development are inextricably linked processes, particularly in the education of deaf students. It is important to consider the fact that learning to read is a language process, and children don't learn to read if they don't have a language in place. This article considers how children who are deaf achieve literacy in English, and the fact that the process for deaf children is very different than it is for children with normal hearing.

A history of literacy in deaf education

Power and Leigh (2000) provide a historical review of literacy development for deaf learners. The long prevailing view was that reading and writing could substitute for the lack of hearing. In other words, deaf individuals could use reading to substitute for hearing, and writing for talking. This view was promoted as early as the 16<sup>th</sup> century. This thinking took a further step when educators advocated language acquisition through reading and writing. Alexander Graham Bell, an advocate of oral education for the deaf, believed that reading and writing should be introduced to the youngest deaf children “regardless of the fact the children may not understand the meaning of the words on the printed page before them.” Bell continued, “I would have a deaf child read books in order to learn the language instead of learning (language) in order to read books” (POWER; LEIGH, 2000, p.4). This view wasn't challenged until Mildred Groht, an advocate of oral education for the deaf, wrote in 1955 that reading should be built on a foundation of spoken language, recognizing that language acquisition should precede reading development for deaf children, just as it does for hearing children.

Reliable measurement of reading achievement among deaf students was difficult until the development of deaf norms for the Stanford Achievement Test<sup>2</sup> in the late 1970's and early 1980's. The Stanford Achievement Test Hearing Impaired Edition, 1982 made the tracking of national progress in reading achievement for deaf students feasible (MOORES; KLUWIN; JOHNSON; EWOLDT; COX; BLENNERHASSETT; SWEET; FIELDS; 1987; PAUL, 1998). GRI is now completing norms for deaf and hard of hearing students for the SAT 10<sup>th</sup> Edition (GALLAUDET RESEARCH INSTITUTE, 2004).

Prior to 1975, classroom instruction, at least through elementary school, was primarily oral, and research comparisons made between signing deaf and oral deaf students tended compare deaf children of deaf parents and deaf children of hearing parents. In the 1980's, two major studies compared the reading achievement of deaf students who signed (MOORES, 1987) and deaf students who were oral (GEERS; MOOG, 1989). In these studies, the use of sign language (whether students used signed or oral communication) was considered as a variable. However, these studies did not include any measure of the subject's fluency in sign language as a variable (CHAMBERLAIN; MAYBERRY, 2000). However, recent studies consider the relationship between competency in ASL and English literacy. Because there is no standardized instrument for measuring ASL proficiency, such studies have been limited (CHAMBERLAIN; MAYBERRY, 2000). Several research teams have been working over the past decade to develop appropriate instruments to measure ASL proficiency but to date, none are widely available (MALLER; SINGLETON; SUPALLA; WIX, 1999).

Over the past thirty years, approaches to teaching reading and developing English literacy in deaf children have changed. Until the mid-1970's, most classroom instruction for deaf children was strictly oral, at least until sixth grade (LOU, 1988; MAYBERRY, 1994; MAYBERRY; EICHEN, 1991; MOORES, 1987). Additionally, prior to passage of PL 94-142, The Education of All Handicapped Children Act, in 1975, most deaf children were educated in residential schools for the deaf (MOORES, 1987) where they acquired ASL outside of the classroom, from each other (deaf children of deaf parents were fluent models), and from deaf adults who worked in the school (PADDEN; HUMPHRIES, 1988; MAYBERRY, 1994). Since the early 1970's, there has been a more widespread use of sign language in educational programs for deaf children. Signing deaf children are viewed as bilingual, using both American Sign Language (ASL) and English. The question that remains is: What do we need to understand about the interaction between signing deaf children's two languages to improve outcomes for English literacy?

### **Language as a foundation for literacy**

Hearing children, as well as deaf children with signing parents, acquire language spontaneously through interaction with adults who serve as competent language models. However, many deaf children, have limited or no opportunities to acquire language this way. Deaf children enter school with significantly less expressive and receptive language (either spoken or signed) than hearing children their age, and their vocabulary knowledge is very limited compared to hearing peers (MARSCHARK; LANG; ALBERTINI, 2002). Because of these gaps, the focus in deaf education has long been on *teaching* language, and too few deaf children have the opportunity to *acquire* language from birth.

### **Developing a language base for literacy**

Children exposed to accessible language *acquire* language, but *all* children must be *taught* to read. Does early exposure to sign language provide the language base needed for literacy in English? Any language or combination of languages, including signed languages, can accomplish the linguistic, cognitive, and social-emotional tasks of the infant and young child, provided it is accessible to both the child and caretaker (SLOBIN, 1985).

Erting (2003) argues we need to study emergent literacy in deaf children, within the family and early intervention contexts, in order to understand the process of early literacy development of deaf children. Research on the early literacy experiences of deaf children can provide us with insights into the characteristics of successful deaf learners, particularly their caretakers that can guide interventions long before reading becomes a focus (ERTING, 2003). Early identification of hearing loss is critical to assure sufficient conditions for the deaf child's literacy development. However, unless parents, family members, professional daycare providers, and infant and preschool teachers become visually oriented, learn to sign proficiently, and understand how to create language and literacy rich environments, deaf children will continue to arrive at kindergarten unprepared for school (ERTING, 2003, p. 21).

Erting suggests that one approach to understanding the early acquisition process is to study successful deaf children—those deaf children whose early literacy development schedule parallels that of their hearing peers—in order to analyze how these children negotiate their two worlds throughout their education. Other approaches might be to develop hypotheses based on the constellation of home literacy features that are likely to promote literacy development, and to

compare communication processes and literacy outcomes in families with constellations predictive of higher or lower literacy. Erting makes the case for the critical importance of providing young deaf children the same opportunities hearing children have for language and literacy development by providing accessible classrooms in which they can acquire ASL and English.

An extensive body of research on early language and literacy development, including literacy development in low-income and minority families has identified the features of home literacy environments that result in school literacy. We know, for example, that reading to children is important, but even more important is extended discourse between children, siblings, and adults during reading, play, and family conversations. We know that children need to acquire metalinguistic awareness of the different ways of using language in different contexts. Opportunities to engage in extended discourse with teachers (who are competent users of the child's language correlates with outcomes in kindergarten and beyond (DICKINSON, 2001). Without this early scaffolding, which is also linked to home through support from their families, deaf children cannot thrive. When deaf learners' early literacy experiences are postponed, it will be difficult for those students to ever attain grade level literacy skills in English. If bilingual approaches can be effective, they need to be embedded in the earlier care-taking experiences so that they prevent a delay in literacy learning for deaf children (ERTING, 2003; KUNTZE, 1998). However, far too often, deaf children do not acquire a sufficient language base at an early age to serve as a base for literacy, because they lack the language interactions that are crucial for building literacy. Deaf children must engage in sustained interactive discourse with fluent adults in order to lay the foundation for literacy (ERTING, 2003) and this is no different from what hearing children need (DICKINSON, 2001; DICKINSON; TABOR, 2001; ERTING, 2003).

Moeller (2000) found that deaf and hard-of-hearing children enrolled in early intervention programs before the age of 11 months demonstrated significantly better vocabulary and verbal reasoning skills at 5 years of age than children who enrolled later, though their abstract reasoning scores may still be below that of their hearing peers. Furthermore, her research showed that while high levels of family involvement can help those deaf children who enter early intervention later, age of intervention and early language development made more of a difference. In other words, early intervention with early language development makes a significant difference even for children with limited family involvement.

Visual language makes language accessible to deaf children and deaf students are often described as visual learners. ASL is described as a language that is biologically suited to deaf learners (KUNTZE, 1998). Marschark and

Harris (1996) state that young deaf children's early access to an environment that combines sign in any form (i.e. MANUALLY CODED ENGLISH, MCE, or ASL) and experiences with English facilitate the child's later success in reading. Rich preschool experiences are critical for all young learners, and without them, deaf learners literacy development is adversely impacted. The young deaf child, who is deprived of early exposure to accessible language input from fluent language users, may never catch up and never develop age level English literacy. Therefore one reason so many deaf children lack English literacy is the fact they have limited exposure to an accessible language as infants and toddlers.

### **Delayed language acquisition**

The importance of early language acquisition is expressed in the concept of the critical period for language acquisition. Linguists and developmental psychologists, among others, have investigated this phenomenon, with particular attention to determining the constraints of the critical period and understanding the impact of delayed acquisition of sign language on linguistic competence.

The age of acquisition of sign language for deaf children ranges widely (MAYBERRY; EICHEN, 1991), and before the widespread use of sign language for instructional purposes, it was probably more variable. Mayberry and colleagues in a series of studies (MAYBERRY, 1994; MAYBERRY; EICHEN, 1991; MAYBERRY; FISCHER, 1989) considered the evidence that the critical period for language acquisition exists for sign language, as well as spoken language. Native signers (acquisition before age 3) outperform both early learners (acquisition between ages 4 and 6) and later learners of ASL (acquisition at aged 12 and older). The later an individual acquires sign language, the less complete their understanding of ASL, and the more likely their errors will interfere with language comprehension (MAYBERRY; EICHEN, 1991).

Galvan (1999) found that deaf children who are native signers (children of signing deaf parents) process morphological information about signs differently from early signers (deaf children of hearing parents who learned to sign by age 5). All signs consist of three parts: the handshape, a movement, and a location (in relation to the signer's body). Sometimes a fourth component, orientation is included (MAYBERRY; WATERS, 1991). Children who learn to sign from infancy do not perceive signs as wholes, but rather copy parts, or morphemes, of a sign. In other words, they deconstruct or analyze the sign into its parts and reproduce a part. Children who learn to sign later, after infancy, perceive signs as wholes or

gestalts. Native signers gradually learn to combine the morphemes or parts, and remain more sensitive to the morphology of signs. Galvan suggests that native deaf signers can transfer their linguistic knowledge and concepts to English. For example, a native signer who understands the concept of the continuative aspect of verbs (e.g. running) in ASL, can quickly transfer this concept to learning English once the English is translated for them (GALVAN, 1999, p. 324). These findings point to possible ways in which native signers use their first language (L1), ASL, to build their second language (L2), English, through the metalinguistic awareness they bring from their knowledge of ASL to the learning of English.

In order to determine the effect of late first language acquisition for deaf learners, Mayberry (1994) compared two groups of deaf adults who were later learners of ASL. One group were postlingually deafened individuals whose first language was English. Their age of onset of deafness was late childhood or adolescence, and therefore they had had normal hearing through their early childhood. Three groups of subjects for whom ASL was their first language were also included: native learners (0 to 3 years), childhood learners (5 to 8) and late learners (9 to 13). While the ASL as L2 learners did not perform as well as the native users of ASL, they outperformed the late learners and matched the performances of the childhood learners. The late L1 learners, had difficulty, which suggested that a critical period for language acquisition exists for both signed and spoken languages (MAYBERRY, 1994).

Late acquisition also affects the development of word memory in deaf learners (MAYBERRY; WATERS, 1991). Newport (1984) found that late learners were less accurate in their use of ASL grammar, specifically morphology, irregardless of the number of years they had been signing. Late learners of sign are less able to remember and comprehend complex sentences in ASL (MAYBERRY; EICHEN, 1991).

### **From Sign Language to Written English**

This section will consider various theories and evidence that suggest how deaf children move from ASL or other forms of signed language (MCE) to written English. How do signing deaf children bridge ASL and English?

Children who are deaf are often compared to hearing students who enter school with a language that is different from the language that the school uses for instruction and literacy development. There are critical differences, however. Most hearing children who enter school as English Language Learners,

come speaking a native language they have learned from birth in their home. By contrast, deaf children commonly enter kindergarten with extremely limited language bases, particularly when they have had limited or no early intervention. The average deaf child may know a few dozen words at this age while his or her hearing peers may already know hundreds (MARSCHARK, LANG; ALBERTINI, 2002). Goldin-Meadow and Mayberry (2001) argue that children cannot learn a first language through print because text is not interactive. Deaf children have tremendous difficulties learning to read English, because children cannot learn to read a language they do not know (WILBUR, 2000).

Deaf children of deaf parents read better than their deaf peers, but the language they know (in most cases) is ASL (GOLDIN-MEADOW; MAYBERRY, 2001). Additionally, the reasons deaf children of deaf parents are more successful readers is likely related to a number of factors (early access to accessible language, parents who understand what deaf children need, use of specific strategies to link ASL and English), and not knowledge of ASL per se (HARRIS; BEECH, 1998).

Some argue that using ASL as the language of instruction with deaf children may inhibit the development of English literacy (KUNTZE, 1998; HOFFMEISTER, 2000). However, ample evidence suggests that this is not the case, and that sign language skills are excellent predictors of reading achievement (HOFFMEISTER, 2000; PADDEN; RAMSEY, 2000; STRONG; PRINZ, 1997, 2000). Chamberlain and Mayberry (2000) point out that the research indicates that a positive relationship between ASL development, and English literacy exists. They go on to say it is improbable that the development of ASL knowledge alone leads to English literacy, but we do not yet understand what the critical factors are in the relationship between ASL knowledge and skill, and reading skills.

Delayed language acquisition makes the task of becoming literate in English complicated. The fact is that most deaf children approach the task of written literacy with a limited base in any language, which makes them different from hearing English Language Learners<sup>3</sup> (ELLs). Those deaf children who have had early access to sign language are at an advantage, but they are the minority. Their parents, deaf or hearing, have signed to them from infancy, and they have had access to language in their home environment. Their language experiences, prior to school, has allowed the development of age appropriate cognitive and linguistic skills.

For hearing children, who speak the language of instruction in their school, the task of learning to read means decoding a language they already know. Children learn to decode (read) and encode (write) words that, for the most part, they understand. They usually develop their emergent literacy skills working with

concepts and contexts that are very familiar to them, including home, family, and the neighborhood. This stage does not require young children to grapple with new concepts or a lot of new vocabulary. The focus is to develop an understanding of what reading and writing are and the purposes they serve. However, for deaf children, as has been pointed out, reading and writing have long been the techniques used to teach them language. Therefore, for deaf children reading isn't decoding a language they know; instead it's very often the vehicle for learning English.

While reading instruction for deaf students has moved away from the model that taught English through reading, this does not mean that deaf children don't learn English through reading. Gioia, Johnston, and Cooper (2001) remind us that deaf children must learn to read English while they are still learning English. Deaf children who read a lot, read better and their English improves (KUNTZE, 1998). There is a cyclical aspect to the reading process. By reading, the reader learns more about English—more vocabulary, more grammar, and so on. Thus the two processes, reading English and learning English, are entwined for deaf learners; furthermore, skilled deaf readers continue to use reading to build their English language skills. Marschark and Harris (1996 p. 290) also describe a phenomenon they call 'reciprocal causation' (p. 290) which is although more reading helps readers improve, poor readers can't improve by reading because reading is such a difficult task.

How does a deaf child become bilingual? There are vying theories regarding the role of ASL in the development of English literacy (MUSSELMAN, 2000; WILBUR, 2000). Musselman's (2000) comprehensive review of reading and deafness, considers how deaf children move from sign to print. Musselman notes that some researchers emphasize the critical role of phonological awareness (in sight into oral language) even for deaf children, while others consider alternative forms of coding – for example, sign coding – used by deaf readers. There are numerous studies of deaf learners, children as well as adults, that find a relationship between the use or accessing of phonological information and better reading performance. Musselman concludes that the use of phonological coding by deaf readers may be an *outcome* of learning to read English, rather than a *prerequisite* to developing reading skills in English.

### **ASL competence as a factor in English literacy**

There has been a lack of empirical evidence that ASL acquisition facilitates the development of English literacy (HOFFMEISTER, 1997). In the 1960's and 1970's research on reading and deafness focused on differences between deaf

students with deaf parents and those with hearing parents. After the use of sign language in classroom instruction became more widespread in the 1970's, comparisons of reading achievement in signing deaf students and oral deaf students were carried out (CHAMBERLAIN; MAYBERRY, 2000).

In the late 1980's two large scale studies of predictive factors of reading skills in deaf children were carried out. The projects based in the United States were done by researchers at Gallaudet (MOORES, 1987; MOORES; SWEET, 1990) on signing students, and at Central Institute of the Deaf (GEERS; MOOG, 1989) on oral deaf students. The Canadian project was based at Mc Gill University (DONIN, DOEHRING; BROWN, 1991; MAYBERRY; WATERS, 1991; WATERS; DOEHRING, 1990).

The Moores et al (1987) study examined two groups of signing deaf students – one group with hearing parents and one with deaf parents. The study measured reading and writing outcomes in deaf 16 to 18 year olds in Total Communication programs. Half of the subjects had deaf parents. Reading comprehension, knowledge of English vocabulary, and syntax as well as ASL proficiency were measured. The results found that written English ability and vocabulary knowledge accounted for almost all of the variance in reading achievement among subjects.

Mayberry and colleagues (CHAMBERLAIN; MAYBERRY, 2000) also looked at factors that would predict reading success for signing deaf students. While Moores and colleagues found no correlation between comprehension of ASL and reading skills, the Canadian researchers did find a positive correlation between ASL proficiency and reading scores. Their subjects formed three groups ages 7-9, 10-12 and 13-15, and half were from deaf families. They used several measures of ASL proficiency and two measures of reading comprehension. They found strong correlations between comprehension of ASL stories and reading story comprehension, and with SAT scores.

The results of Moores et al contrasts strongly with the studies by Mayberry and colleagues. In the Moores et al study, the measures of English literacy skills were made using multiple measures and instruments, but the measure of ASL was not. The ASL instrument (the Sign Communication Proficiency Interview , SCPI) found little variance across all subjects and may have not been sensitive enough as it was only a measure of ASL proficiency on 5 levels (CHAMBERLAIN; MAYBERRY, 2000; HOFFMEISTER, 1997). By contrast, Mayberry and colleagues measured ASL comprehension on the sentence and the narrative level. They also conducted a sentence span test which measures the amount of mental effort a subject uses to comprehend a sentence. These studies were the first attempts to measure ASL proficiency when testing for reading skills (CHAMBERLAIN; MAYBERRY, 2000).

## **Considering ASL fluency**

Hoffmeister and colleagues (HOFFMEISTER, 1997; 2000) wanted to determine the relationship among English reading achievement, knowledge of complex sentences in ‘manually encoded English’, and the comprehension and production of ASL. They studied deaf students aged 8 to 16 years. Twenty-one of the fifty subjects had intensive ASL exposure (through deaf parents, or residential schools). Measures were made of reading comprehension in English and ASL. Results included finding that the knowledge of complex English syntax was the major predictor of English reading achievement as measured by comprehension and production of complex sentences in ‘through the air’ English (MCE) tasks. Additionally, advanced knowledge of ASL as reflected in meta-linguistic tasks presented (synonym/ antonym judgment) were also significant predictors of English reading achievement. Their conclusion is that fluency in ASL particularly the development of meta-linguistic skills, allows deaf readers to reflect on language structure and do better on decontextualized reading tasks. They conclude that higher level skills in both ASL and English facilitate the development of higher reading skills in English.

Strong and Prinz (1997, 2000) studied the relationship between competence in ASL and English reading performance and found that even though students with deaf mothers outperformed their peers in reading tests, when levels of ASL competency were equivalent for deaf children of hearing parents, there were no differences. They conclude that the acquisition of ASL improves the reading for all deaf students regardless of parental hearing status. They argue, therefore, that bilingual-bicultural programs for deaf students will produce better outcomes in terms of English literacy. They have determined there is a correlation between level of ASL competence and English literacy.

## **The transition from sign to print**

A common belief among advocates of bilingual deaf education is that if children have ASL as a first language (or another natural sign language), this transfer of cognitive/academic knowledge to English, will support the development of English literacy.<sup>4</sup> Some educators assert that deaf children can move from a visual-gestural language such as ASL directly to a printed language such as English.

## **Linguistic interdependence**

Cummins’s theory of Linguistic Interdependence (1984) is often used to explain the process used by ELL’s approaching the task of reading in their second

language. This theory states that literacy skills in one language can be transferred to a second language. Learners have a foundation of cognitive and linguistic skills that support literacy. This foundation can be established using their first language, and be taken advantage of by their second language.

Swedish approaches to bilingual education of deaf children emphasize first language development in Swedish Sign Language, and while deaf children are exposed to written texts which are 'read' to them in sign, instruction in Swedish, their second language is postponed (SVARTHOLM, 1994). Direct instruction in written language is delayed and teachers tend to believe (rather than directly facilitate) deaf children will learn the connection between sign and print (DAVIES, 1994, p. 107).

However, there is a lack of empirical evidence that the Linguistic Interdependence Theory applies in the case of deaf children. Mayer and Wells (1996) question the validity of Cummins' Linguistic Interdependence Theory for deaf learners, and the claim there is a transfer of cognitive/academic or literacy skills across languages. Because sign languages are unwritten,<sup>5</sup> deaf learners do not learn to read their first language (L1). Furthermore, ASL and English are in two different modes—ASL is in a visual-gestural mode and English is in a spoken mode. While Cummins' theory has been validated in the case of transfer of literacy skills from L1 to L2 (their second language) for spoken languages, this is less true when the two languages have different orthographies. Additionally, if L1 is an oral language and unwritten, there is no evidence for transfer of skills (MAYER; WELLS, 1996; MAYER; AKAMATSU, 1999).

### **Deaf-Evolved Strategies**

There are a number of strategies described in the research literature that are used by deaf adults, including parents, and teachers, in their language and literacy interactions with deaf children. They will be referred to here as Deaf-Evolved Strategies. Deaf adults provide input to deaf children that includes a range of strategies for explicitly linking ASL with English, including mouthing, chaining, initializing, and sandwiching (ERTING, THUMANN-PREZIOSO; BENEDICT, 2000; BLUMENTHAL-KELLY, 1995; PADDEN; RAMSEY, 1998; 2000). Chaining is a way of linking a sign to print. A word is fingerspelled, the teacher then points to the print, and then fingerspells it again. Sandwiching, described by Blumenthal-Kelly (1995), is used by deaf parents when reading to their deaf children. Like chaining, the sign or fingerspelled item occurs before and after the middle item, a fingerspelled word or word in English print. For example, when reading, a

parent may sign DUCK<sup>6</sup> point to the word, then sign DUCK again. It is important to note that deaf children do not do this linking on their own, and that adult mediation and scaffolding is essential in this process (PADDEN; RAMSEY,1998).

There is a need to study and document how and when deaf children use fingerspelling in order to understand how it may support the development of literacy in English (AKAMATSU; ANDREWS, 1993). Erting, Thumann-Prezioso, and Benedict (2000) studied deaf parents' interactions with their deaf infants in order to understand the development of deaf children's competence in fingerspelling, including when and how it occurs, and how children learn that fingerspelling represents English. Over a period of four years, they videotaped two fourth-generation deaf infants, from shortly after birth. In the earliest weeks of the infants' lives, deaf parents were observed as active participants to engage "finely tuned, mutually enjoyable interactional exchanges" through the use of ASL. The use of fingerspelling was relatively rare during the first two and one-half years, but by the end of the third year, there were more interactions that linked fingerspelling with printed text. By the second half of their third year, the children attempted to fingerspell their own names and invented fingerspelled names for their dolls. The parents used a variety of strategies including letter calling, chaining structures, and play practice with name signs and their fingerspelled translations; deaf parents mediate English print for their children, and in this way help their children develop emergent literacy on similar developmental timeline as hearing children.

Padden and Ramsey (1998 p. 32) make the case that merely knowing ASL does not support the development of English literacy, but that tying specific elements of ASL to English print is what supports reading. The authors claim that ASL does not "naturally link with written language", but that deaf children learn to form and practice these associations. Deaf readers have "cultivated" these strategies in order to "crack the code of written language" ( PADDEN; RAMSEY, 1998, p. 45), and these strategies are used routinely by deaf parents and deaf teachers with deaf children. Deaf children who sign ASL don't automatically read well, any more than hearing children who speak English do.

The researchers suspected that the use of fingerspelling and initialized signs were likely to link to English literacy. Fingerspelling is the equivalent of spelling out loud, something we don't routinely do in spoken languages. In an initialized sign, the first letter of the English word is incorporated into the sign. Many initialized signs are part of ASL, whereas others can be used to clarify the word being signed.

Padden and Ramsey administered three measures of ASL fluency and three for English to thirty-one deaf children. They found that the initialized signs task and the fingerspelling task highly correlated with each other, and that deaf students

who performed well on the fingerspelling task also scored high on the reading measurement. Those students who had the greatest difficulty were those who had entered school later than their peers, including immigrant students. Strategies which link ASL to English are more apparent in environments in which many deaf adults are found, and while Padden and Ramsey don't claim that their use makes deaf students more effective readers, there appears to be a relationship between the use of these kinds of strategies and improved English literacy.

### **The role of Manually-encoded English**

There is a body of literature that argues that deaf children need to use manually coded English as a bridge from ASL to English (MAYER, 1999; MAYER; AKAMATSU, 2000; MAYER, AKAMATSU; STEWART, 2002). Mayer and Akamatsu (1999 p. 2) state that ASL (or any other native sign language) can "provide the cognitive power that supports broad conceptual and cognitive transfer" but that ASL doesn't "directly mediate the development of text-based literacy in the majority spoken language". They argue that the deaf learner cannot bypass the speaking-writing connection in the development of written literacy (MAYER; ARAMATSU, 1999, p. 5).

Mayer and Akamatsu (2000) studied adolescent deaf students' written English and they concluded that the students understood the texts in either MCE or ASL, and an "internal English" (inner speech in the Vygotskian sense) is needed to compose in English. Furthermore, they argue that deaf children of hearing parents may do better with MCE as a first language and suggest that MCE has a role as the language of literacy and ASL, as the language of communication.

### **Multiple Strategies**

There are multiple ways to obtain English literacy (PADDEN; RAMSEY, 1998), and multiple strategies. Literate deaf adults *do* use manually coded English, but we don't know exactly how the development of MCE occurs. To some extent this claim recognizes that both Deaf-Evolved Strategies and the MCE as a bridge to English may provide some of the answers to how deaf individuals become skilled readers.

Gioia, Johnston, and Cooper (2001 p.4) describe the use of multiple strategies. They also argue that MCE is a "useful bridge" for connecting spoken and signed language, while acknowledging that this is a somewhat unpopular view. However, they recognize that MCE plays no more than a "brief mediating role". In other words, the use of

*Barbara Gerner de Garcia*

manually coded English is not *the* bridge to English literacy, but a tool that helps the deaf child obtain English literacy. It could be argued that English literacy learning can be supported by any form of signing. It is not signing in MCE that compensates for the lack of spoken English and allows the deaf learner to develop inner speech, but rather the case that signing can mediate written English for the deaf learner.

Multiple strategies are similar to Wells' "tool-kit" idea (WELLS, 1986). However, there seems to be a lack of agreement on what the tool kit should contain. The review reflects a multidisciplinary perspective and therefore assumes that there may be more than one approach that will provide the key and that literacy development by deaf children as a process that requires *many* tools. Rather than prescribing what teachers should do (and implying what the deaf learner should do), we should be observing how deaf children use ASL to bring meaning to text. What are the possibilities that manually coded forms of English may be tools? As in the case for phonological coding, we don't know whether MCE helps deaf children learn English (MAYER; AKAMATSU, 1999). Deaf children are active constructors of meaning in interactions with written English, regardless of the forms of signing they use—ASL, manually coded English, or Signing Exact English (SEE). What seems important is that they have a language that enables them to make meaning and understand more about what leads to English literacy.

### **Implications for Research on Deaf Children's Literacy**

Current theory and research on the acquisition of English literacy by signing deaf children has used mainly studies of children who are already in school and have delayed reading development. Through studies of teachers and students in school programs, researchers explore how adults tie specific elements of ASL to English print. The strength of these streams of research is that they are drawing our attention to the acquisition process and the role that adults can play in scaffolding it. Researchers are exploring a variety of possible strategies that adults may use for helping children create meaning across languages. Either approach requires that we draw on what we know about deaf literacy—the research reviewed here—together with our current knowledge of language processes in families of deaf children, and our knowledge of the features of home language environments that promote literacy development.

### **Notas**

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- 2 The Stanford Achievement Test, (SAT) published in the United States by Harcourt Educational Measurement, has norms developed for deaf students by the Gallaudet Research Institute (GRI).
- 3 English Language Learners are students who don’t know English when they begin school . They are immigrants and children of immigrants, as well as American Indians.
- 4 Sweden is often cited as the prime example of deaf children moving from a sign language as L1, Swedish Sign Language, to the written majority language as L2 (MASHIE, 1995). However, Bagga-Gupta has found little empirical evidence for the claims being made by Swedish educators of the deaf in her work in progress on literacy in deaf education in Sweden (personal communication, June 2002).
- 5 There is a system called Sign Writing, developed by Sutton, but its application has been very limited .
- 6 Writing in all capital letters is a convention used to indicate a English translation, for an ASL sign.

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Barbara Gerner de Garcia

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