Chapter 10

American Sign Language and Reading Ability in Deaf Children

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The intent of this chapter is to examine bases of reading ability in signing deaf children. If learning to read is viewed as the task of learning the relation between spoken language and its representation in print (Adams, 1990; Liberman, Shankweiler, Liberman, Fowler, & Fischer, 1977), then the task of learning to read in the case of signing deaf children must be doubly complicated. First, of course, is their lack of direct access to spoken language. They do not hear, and presumably do not use, at least not efficiently, sounding out processes that might help them learn to read. Second, the form and structure of the signed language they use is unrelated to either spoken English or its written form. If signed language competence has a relation with reading, it is not obvious why it should. Indeed, most of the literature on reading development and achievement in deaf children does not include deaf children's signed language competence as a variable (e.g., Conrad, 1979; Campbell, 1992; Hayes & Arnold. 1992; Holt, 1994).

Recently, there have been suggestions that American Sign Language (ASL) skills might play a role in reading (Kuntze, 1994; Paul, Bernhardt & Gramly, 1992), in part because of studies showing that deaf children with deaf parents perform well on reading achievement tests when compared to deaf children of different backgrounds (Mayberry, 1989; Moores & Sweet, 1990; Prinz & Strong, 1998; Singleton et al., 1998). One could argue, however, that the relation between signed language and reading is simply fortuitous. A child's skill in ASL provides a linguistic foundation from which development of another language skill such as reading can

LEA–MARTIS GRAPHICS–LANGUAGE ACQUISITION BY EYE (CHAMBERLAIN/MORFORD/MAYBERRY)

take place. Possibly also, experience with ASL forms a symbolic base from which children can learn meaning of words in print. This is essentially the claim that Paul et al. (1992) made: Children who comprehend written text and the message of the text are better equipped to carry out the decoding that is basic to reading ability. Paul et al. also referred to the influence of a community of deaf adults who read as enabling deaf children to imagine themselves as readers. These are important, even essential, elements to reading development, but the question of whether ASL specifically is implicated in reading and writing ability has yet to be addressed.

For the last 3 years, our research group has been involved in a project to study reading achievement in deaf children.[1] Like others who have studied this population, we are intrigued by the unusual challenges deaf children face. Whereas others have studied oral deaf readers (Waters & Doehring, 1990), or hard-of-hearing readers (Arnold & Mason, 1992) and explored to what extent their experience with spoken language aids reading development, our focus is on a population of deaf children whose early experiences instrumentally involve signed language. These are children who grow up using sign language either at home or at school. They are also more likely to have greater degrees of hearing loss: as a consequence, they face a daunting challenge in learning to read (Conrad, 1979; Karchmer, Milone & Wolk, 1979).

The investigation we describe here has three components: (a) a detailed demographic assessment of individual and social variables of deaf students participating in our study, (b) results of a language battery testing interrelation between reading ability and specific language skills, and (c) a descriptive study of classroom instructional techniques involving signing and written English and their role in reading development. The latter component follows from a basic premise we hold, namely, that reading development is unique among the language skills in that it is not natural. It requires presence of language and cognitive ability but is intimately linked to contexts of instruction. Even with good language skills, very few children can teach themselves to read; instead they need guidance by skilled adults. The three components of our research are joined by a design that measures component skills of children who are trying to learn to read with the aid of others and to a large extent within school settings.

The deaf children who participated in our study came from school settings most typical for children of this type of hearing loss (Holt, 1994)—a residential school that employs ASL-based approaches to teaching and a

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public school special program that uses a *total communication* approach.[2] In the latter environment, there is some presence of ASL, used by deaf teachers and competent hearing signers, but it is not officially targeted as a language of instruction. In the former, the school actively seeks to incorporate ASL in the curriculum, and teachers are invited to engage in innovative curriculum development that includes training in ASL. This variation in emphasis on ASL by school setting not only gives us access to children of different backgrounds within a narrow range of overall deaf and hard-of-hearing population, but also allows us to examine the impact of different instructional environments on reading development. Further, because we wanted to study reading instruction, we selected deaf children who were taught in reading classes specifically designed for them. We did not include children who were mostly or entirely integrated into classrooms with hearing children. This investigation focuses primarily on deaf children who use signed language with each other and with their teachers and who attend special classes with other deaf children.

The results of our language battery show that knowledge of specific ASL structures correlates with reading achievement. Young deaf children who perform better on reading tests are those who are also competent in what we call *associative skills,* or have the ability to write down words that are fingerspelled to them, and are able to translate initialized signs. We find that these skills are more likely to be found among deaf children who have grown up with ASL, as with those who have deaf parents, but they are also used by other children who perform well on tests of ASL ability.

When we examine the better readers' demographic backgrounds, we find that they share certain characteristics. Among the significant correlations we find with higher reading scores are having deaf parents, early detection of deafness, and an absence of handicaps. Because the children we studied had similar degrees of hearing loss, which was generally severe to profound deafness, and had similar etiologies, or causes of deafness, which was either deafness from birth or shortly after, the age at which they became deaf was not significantly correlated with reading achievement. Instead, the age at which their deafness was detected and reported in school records turned out to be significant. We believe this variable measures when families start to reorganize their communicative resources and plan alternative schooling for their children.

From our videotapes of classroom teaching techniques, we found examples of how young deaf children become aware of associations between ASL and written text. Using these data, we argue that associative skills such

[2]Because most states support only one residential school, we do not identify the state or the region in which the schools are located to ensure the privacy of the students, teachers, and school administrators in our study.

as those we uncover in our language battery need to be discovered and cultivated by a process of language and reading instruction that teaches children to link ASL morphology to English orthography. We do not view these skills as "naturally" acquired in the same sense that ASL competence is; instead, they must be fashioned by way of instruction.

Our findings lead us to some central issues about the process of learning to read, as summarized in Adams (1990). For young hearing readers, those who can learn to associate sound elements with orthographic representation are more likely to succeed at reading. The better readers in our study have made an alternative discovery in which they form associations between elements of a signed language and elements of a written language as they acquire the ability to read. In addition to the question of whether and how these associations promote reading development is the equally interesting question of how these associations come about. We suggest that these associations are not fortuitous or idiosyncratic discoveries by individual children, but result from systematic exposure to a culture of signers and adult deaf readers who directly and indirectly teach young signers how to make sense of written English text. Our findings emphasize that whereas reading is an individual accomplishment, it is fundamentally a cultural achievement in which forces of society and institutions combine to support a notable alternative route to reading.

STUDY 1: DEMOGRAPHIC AND BACKGROUND ASSESSMENT

Student Characteristics

Mertens (1990) found that most survey research on deaf children concentrates on individual characteristics such as onset of hearing loss, degree of hearing loss, age, and individual performance on specific tests, often to the exclusion of a wide range of variables that measure institutional and social characteristics. Accordingly, we developed a list of characteristics for student backgrounds that measure not only enduring individual characteristics but social characteristics as well, such as hearing status of parents, ethnicity, age of first educational contact, and age when the child's deafness was detected. We also included a measure of when the child began attending school and the length of time the child remained in one type of program. The latter variable, termed *tenure*, was designed to examine the effect over time of a particular school setting on the child's reading achievement.

Because we were interested primarily in reading development during the crucial first levels of school, we solicited participation only from elementary and middle school students. Their parents were mailed letters

explaining the project, including what information would be gathered and what tests would be given to their children. Parents of 135 students returned consent forms, 83 in the residential school and 52 in the public school.[3] With their consent, we gained access to their children's files for the purpose of coding for a set of background characteristics. Also from the files, we obtained the students' most recent Stanford Achievement Test (SAT)–Hearing Impaired[4] scores, including their SAT–Reading comprehension (SAT–R) and the SAT–Math computation (SAT–M) scores. Of the 135 students in our survey, 98 had valid reading comprehension scores and 73 had math computation scores.

The first fact to emerge from our data is that we did not have similar groups of children at the two school settings. The proportion of students with deaf parents in the residential setting participating in our study was nearly five times higher than that in the public setting. The ethnic status of the students in the public setting indicated a much higher degree of heterogeneity than in the residential setting. Deaf children at the public school who participated in our study were nearly twice as likely to have a physical handicap such as impaired vision or mobility compared to those who participated at the residential school.

At least one influence on this pattern of enrollment is educational policy that promotes philosophical choices by parents. Since the 1970s, when public schooling of deaf children became more widely available and residential schools were no longer the dominant (or only) educational option for families, parents needed to decide which school setting to choose for their deaf child (Ramsey, 1997). In our population, deaf parents were far more likely to select the residential school in part because, as many of them told us, they had attended similar schools as children and they continued to believe that such schools best accomodate their ideas about language environments for their children. The residential school we used for our study reported that approximately 12% of their school population, from preschool to Grade 12, are children with deaf parents. The public school district, in contrast, had less than 1% children with deaf parents

[3]The greater representation of residential school students in the study reflects the differential enrollment levels at the two schools. The residential school reports an enrollment of 206 students in the elementary and middle schools compared to 88 students in the public school at the same levels. To evaluate interrelations between reading development, classroom instruction practices, and signing ability, consent forms were not distributed to parents of students who were fully mainstreamed or students with severe emotional or cognitive handicaps because these are students who do not participate in regularly scheduled classes of reading instruction with other deaf students.

[4]The tests that were administered to the students in our study were normed for hearing-impaired students. Although the tests themselves are identical to those given to hearing children, the screening procedure to determine which level of test to give to the deaf child is based on guidelines developed specifically for deaf and hard-of-hearing children.

TABLE 10.1
Demographic Comparisons Across School Settings

Variable	*Public School (N = 52)*	*Residential School (N = 83)*
Handicaps	19%	10%
One or more deaf parents	8%	39%
Ethnicity (% White)	33%	70%
Mean age of first educational contact	3.125 years	2.34 years
Mean age of detection of deafness	2.2 years	1 year
Mean tenure in program	3.5 years	3.2 years
Mean degree of hearing loss[a]	3.06	3.45
Mean SAT–HI Reading Comprehension score[b]	534.42	567.23

Note. SAT–HI = Stanford Achievement Test–Hearing Impaired.
[a]Pure tone audiometry on ascending scale of 1 to 4, with 4 = profound deafness.
[b]Scaled score.

across all levels of schooling. In our study population, we had a higher proportion of children with deaf parents (20% of our total group of 135 students), almost all of whom had children at the residential school.[5]

The presence of deaf children of deaf parents in our population influenced school group means by nearly every characteristic. Deaf parents are more likely than hearing parents to recognize deafness in their child at an early age and to locate schooling for their deaf child at an earlier stage, pushing means for both of these characteristics at younger ages for children at this school setting. Of our population of deaf children of deaf parents at the residential school, 78% are White, reflecting demographic studies showing that the condition of congenital deafness is more prevalent within the White population in the United States than among other ethnic groups (Holt & Hotto, 1994).

In contrast, the public school's location near an urban center as well as its accessibility to families who recently emigrated to the United States result in a larger diversity of ethnicity among its students. As for why the public school had more children with handicaps and illnesses, it may be that parents want them to remain closer to home, where medical care is more convenient. As discussed next, we found many of these characteristics to interact with reading achievement (Table 10.1).

A key point here is that any attempt to measure the effect of school setting on reading achievement requires analyses that recognize that popu-

[5]Possibly, the higher participation rate of deaf parents in our study was due to our description of the goals of the study as exploring factors of "sign language and reading," a topic of specific interest to middle-class deaf parents.

lations in the two types of school settings are not randomly distributed in terms of characteristics. This is not a surprising discovery, but it also bears noting that although school populations may vary in terms of characteristics such as ethnicity and family income, they also vary in terms of the proportion of children with deaf parents and by consequence, the average age of detection of deafness among their students. Average age of detection in turn influences the average age of enrollment in an educational program suitable for deaf children. Few demographic studies include these characteristics, although as we discuss next, they interact with reading achievement. Our study suggests that although in principle, all options of schooling are available to families with deaf children, educational policy of the last 30 years has led to quite different distributions of students across different schools.

Reading Achievement

Of the 98 students with valid reading comprehension scores (across both school settings), we found three factors to correlate significantly with reading achievement: deaf parents, age of detection, and length of time the child has been in school (tenure). One factor negatively correlated with reading achievement: the presence of handicaps. The need for variables that measure social characteristics was borne out by our discovery that age of detection of deafness correlated with reading achievement. The longer the parents waited before confirming deafness, the greater the negative impact on reading achievement. These variables taken together point to the strong influence of early language experience and school experience on reading achievement among profoundly deaf children. As might be expected, the presence of handicaps complicates the linguistic and cognitive profile of the child, leading to overall difficulty in reading development (Table 10.2).

Returning once more to the issue of school setting, we found that if reading achievement scores are compared across school settings, average scores at the residential school are significantly higher than those at the public school, but if children with deaf parents are removed from the comparison, neither school has an advantage. Because the subject of schooling has such emotional content in the national debate over the future course of deaf education, we refrain from any claim based on our data that either the residential school or the public school has a clear advantage in fostering reading achievement. More of the students attending the public school in our study had handicaps, came from different ethnic backgrounds, and in some cases, started school later because they arrived from a foreign country. All of these characteristics complicate reading development under any circumstances. These observations notwith-

TABLE 10.2
Correlations of SAT–HI Reading Comprehension With Demographic Variables

Variable	*N*	*SAT–HI Reading Comprehension*
Deaf parents	98	.39**
Age of detection	91	–.27**
Tenure	98	.44**
Age of onset	98	.08
Handicaps	98	–.34**

Note. SAT–HI = Stanford Achievement Test–Hearing Impaired.
**$p < 0.01$.

standing, it is clear that the challenge of teaching deaf children to read is one shared by all schools.

STUDY 2: SPECIFIC LANGUAGE SKILLS AND READING ACHIEVEMENT

A central question of our study is whether and how ASL plays a role in reading development, beyond providing a linguistic and cognitive basis for the development of new language skills. To answer this question, we developed a battery of five tests in which specific ASL skills were tested. A total of 31 deaf children in four classrooms were given this battery of tests: two fourth–fifth grade (n = 18) and two seventh–eighth grade classrooms (n = 13), one at each level at a residential and public school for participation in our language testing study. Each child was individually tested on the battery.

Three tests measuring general ASL competence were given: Two were previously developed by Supalla et al. (in press) and a third was developed by our group. The Verb Agreement Production test (Supalla et al., in press) asks the student to view action between two individuals and sign a response in which they inflect a signed verb that corresponds to the action. Their responses were also videotaped and then coded. The third test. Sentence Order Comprehension (Supalla et al., in press), presents students with signed sentences on videotape in which sentence order is manipulated. Students are then asked to point to a picture from a set of four that represents the meaning of the sentence. In the Imitation task, which we developed, students viewed a videotaped ASL sentence, signed by a native signer, and were asked to repeat the same sentence back to a video camera.

The 12 sentence items varied in complexity, with each item no longer than a single sentence. For scoring, semantic substitutions were accepted as correct,[6] but production errors or deletions in the signed response were coded as incorrect (see Mayberry & Fischer, 1989).

The remaining tests were based on a previous study of classroom practice in residential and public schools (Ramsey & Padden, 1998). In this study, we observed teachers—both deaf and hearing—using initialized signs and fingerspelled words at strategic points in classroom instruction about reading and writing. Initialized signs involve replacing the handshape of an ASL sign in order to create related vocabulary, for example, the ASL sign CLUSTER has many related initialized signs: GROUP, FAMILY, SOCIETY, DEPARTMENT, ASSOCIATION.[7] Sometimes teachers used initialized signs in place of ASL signs, but many times they were used in sequence with ASL signs in contrastive ways to highlight English vocabulary. In one example, while giving a spelling lesson, a deaf teacher used the ASL sign GARDEN, followed by an initialized counterpart, GARDEN, to emphasize that the children should write the word *garden*. Where initialized signs only represent one letter, usually the first letter of the English translation of the sign, fingerspelled words represent the entire sequence of letters that comprise the written word. When fingerspelling, signers execute in rapid sequence handshapes that correspond to each letter in the word. As with initialized signs, we saw teachers also use fingerspelled words in sequence with ASL signs and initialized signs. One teacher was explaining about volcanoes, during which she used an initialized sign, VOLCANO, and then immediately in sequence fingerspelled the word *volcano*.

Using examples of vocabulary we saw in our classroom study, we developed two tests that would evaluate how well students knew the association of these vocabulary items to their English counterparts and were able to write them in English. The Initialized Signs test involved 20 items on videotape, each featuring a native signer producing a sentence containing exactly one initialized sign. At the end of each sentence, the signer directed the student to "write [initialized sign]." The tester briefly paused the videotape as the student wrote a response, and then the next item was shown. For example, one sentence was as follows: BOY NOT FOLLOW RULE. NOW WRITE "RULE." Because this test yielded very few correctly spelled responses, we scored by a weaker standard in which the word did not need

[6]For example, a few students substituted Signing Exact English vocabulary, for example, BUS, for signs in the test sentences. They were accepted as correct if the meaning was the same or similar as the test vocabulary.

[7]The convention for representing ASL signs in English is to translate them using single word glosses in capital letters. Initialized signs are represented with a capitalized gloss as well, with the letter corresponding to the handshape of the sign underlined. Fingerspelled words are glossed with single letters joined by hyphens, for example, B-U-S, "bus."

TABLE 10.3
Correlations of SAT–HI Reading Comprehension With ASL Tests

Test	*N*	*SAT–HI Reading Comprehension*
Verb Agreement	22	.51*
Imitation	23	.46*
Sentence order	24	.76**

Note. SAT–HI = Stanford Achievement Test–Hearing Impaired.
**p* < 0.05. ***p* < 0.01.

to be spelled correctly but needed to be recognizable as the target word by three naive independent readers.[8]

On the Fingerspelling task, students watched a sentence on videotape containing one fingerspelled word and were asked a question to aid their recall of the fingerspelled word. In one example, students were shown the signed sentence (translated in English), "The girl needs *ice* for her drink." Following the sentence, the signer on videotape asked "What did the girl need?" We scored according to an exact written replication of the fingerspelled word; that is, the response had to be correctly spelled.

Beginning first with our three tests of ASL ability, we found all to correlate with the student's score on the SAT–R. Interestingly, the relation held for deaf children of hearing parents who would be expected as a group to have less experience with ASL. Of the three tasks, the Sentence Order Comprehension seemed to be the easiest, with students scoring on the average 80% correct. In this task, students were asked to recognize the agent of the signed sentence and select the picture that corresponded to the identity of the agent. The Imitation task was the most difficult, with the average score at 45% correct. The task measures the ability to comprehend, recall, and reproduce sentences in ASL, all of which would appear to draw from not only linguistic ability but memory as well. The Verb Agreement Production measures ability to produce correct ASL verb inflections and does not require recall. Students scored on the average 70% correct (Table 10.3).

To evaluate the possibility that the relation between the ASL and reading tests was a measure of general test-taking skill rather than a relation between two language skills, we examined the students' SAT–M scores to see if this

[8]We recruited undergraduate hearing students from a child development class to read each misspelled attempt. If three students independently agreed on what the intended word was, and if it matched the test item, we scored it as correct.

too had a relation to performance on ASL tests. As it turned out, SAT–M did not correlate with either the Imitation or Verb Agreement Production tests but it correlated with the Sentence Order Comprehension, a task that, for most of our students, was easy to complete. We are not confident that this latter task produces enough variation in scores to observe relations with other skills. Last, the SAT–M also correlated with SAT–R, most likely because this test involves some reading of math problems (Table 10.4).

For students with less skill in ASL, the Fingerspelling task was very difficult to complete. Some struggled with even three- or four-letter words like *wax* or *bark*, reporting instead a collection of letters that did not appear in the word. Others were able to write some of the letters of the word but could not retain their correct order. When we compared test scores, we found that performing well on the task correlated with performance on the SAT–R *and* our ASL tasks (Table 10.5). It is perhaps not surprising that there is a relation between fingerspelling and reading if fingerspelling

TABLE 10.4
Correlations of SAT–Math Computation Wtih Language Tests

Test	*N*	*SAT–HI Math Comprehension*
Verb Agreement	16	30
Imitation	18	.18
Sentence order	18	.62*
SAT–HI reading	73	.75**

Note. SAT–HI = Stanford Achievement Test–Hearing Impaired.
**$p < 0.05$. **$p < 0.01$.

TABLE 10.5
Correlations of Fingerspelling Test With Language Tests

Test	*N*	*Fingerspelling*
Verb Agreement	25	.71**
Imitation	26	.87**
Sentence order	25	.64**
SAT–HI reading	22	.43*

Note. SAT–HI = Stanford Achievement Test–Hearing Impaired.
**$p < 0.05$. **$p < 0.01$.

is seen as a code for print, but it is also interesting that strong ASL skills also play a role (Table 10.5).

A different pattern was found for the Initialized Signs test (Table 10.6). There was no relation between having deaf parents and the student's score on the Initialized Signs test. However, this skill and fingerspelling are highly correlated, which suggests that they are related to each other. Additionally, scores on the Initialized Signs task correlated highly with the ASL measures. This suggests that, as hypothesized, this group of tasks is interrelated. Because initialized signs represent only one alphabetic letter, typically the first letter of the word, the task requires students to know how to spell the rest of the translation without any further clue. As might be expected, students who had better reading ability performed better on this task.

The composite portrait offered by the relation between language skills and reading ability is an intricate one, worth elaborating at some length here. We have demonstrated that there is a relation between certain tests of ASL ability and reading achievement and that this is not a spurious one based on general test-taking skill. Additionally, we found a modest relation between reading skills and what we call *associative skills,* or being able to recognize and translate initialized signs and understanding fingerspelled words, then writing them down. Because associative skills and ASL skills are strongly related, we believe that these special skills that involve both ASL and representations of English are good sites for further research into reading ability in signing children.

So far we have demonstrated only that there are relations, not whether early acquisition of fingerspelling or initialized signs promotes reading development. It is entirely possible that development of reading skill leads to skill in fingerspelling comprehension and translating initialized signs. Hirsh-Pasek & Treiman (1982) advanced this view. From studies of young deaf children, some as young as 3 years old, it is clear they can recognize

TABLE 10.6
Correlations of Initialized Signs Test and Language Tests

Test	*N*	*Initialized Signs Test*
Verb Agreement	23	.76**
Imitation	25	.74**
Sentence order	24	.71**
SAT–HI reading	21	.80**

Note. SAT–HI = Stanford Achievement Test–Hearing Impaired.
**$p < 0.05$. **$p < 0.01$.

fingerspelled words without knowing their counterparts in print (Kelly, 1995; Padden, 1991; Padden & LeMaster, 1985). Indeed, there can be a long dissociation between the two skills until the child begins to learn to read: In some cases, these young children are surprised to discover that fingerspelled words have counterparts in print. These studies suggest that although fingerspelling, reading, and writing are related by virtue of their coding of the alphabetic system, the timetable for development in each may be very different and uncoordinated until later in life. Of special interest is how and where the systems converge to produce a coordinated set of knowledge about English in print. Our fingerspelling task was not solely a recognition task in which children were simply asked to report the meaning of the word, but it required students to write the words in English. This skill may take place later, when students are able to bring all three skills—fingerspelling, reading, and written spelling—to bear on the task. Again, it is interesting to see that when these skills are marshalled to complete the Fingerspelling task, the student is more likely to have very good ASL skills as well, supporting our claim that the successful deaf signing reader is one who can draw from several composite skills.

STUDY 3: MODES OF READING INSTRUCTION

In this study, our goal was to observe more closely instructional practices of teachers involving print, and to study observable reading processes in individual deaf students. For the first part of the study, involving instructional practices, four classrooms were videotaped three times in one academic year, once each in the fall, winter, and spring. Two classrooms were at the elementary level, one at each school setting, and the remaining two were at the middle school level, also one at each school setting. Each visit yielded 1 week of videotaped classroom activity. For the second part of the study, each student participating in the classrooms was videotaped while reading a story aloud. From these observations, we aimed to learn more about institutional influences on reading behaviors.

Reading Processes

A task was devised in which a member of our research staff asked each student in the classroom study to "read aloud" or sign from a book selected as being at or slightly above their reading level (we used their teachers' judgments). If students wanted assistance with individual print words, it was given. Although we do not assume that this task for deaf children is identical to reading aloud for hearing children, nor that it is an easy one to do, the children generally complied because reading aloud in signs is

a common task in both school settings. The transcribed signed reading aloud was compared to the target story and coded for miscues. Conventional miscue categories were used, including omissions, substitutions, self-corrections, and observation of sentence boundaries. We also noted fingerspelling and mouthing, as well as use of initialized signs and classifier signs while reading aloud.

We found that students had widely varying reading aloud behaviors, and some could not retell with comprehension after reading aloud a story. Aside from the general difficulty many had, at least two major patterns of reading behavior could be observed in students, one characterized by "attacking and analyzing words," and another, by "seeking meaning." The differences are best exemplified by comparing the performance of two fourth-grade students, Billy and Roy,[9] who are native signers. Billy has a deaf mother and a hearing father, and Roy has two deaf parents. Billy has always attended a public school; Roy attended a public school briefly but is currently a student at the residential school.

Billy is not an exceptional reader: He scored in the 56th percentile on the SAT–R of deaf readers his age. When Billy read aloud, his attention was focused on individual words. To Billy, reading meant mapping individual signs onto print words or morphemes. This strategy led to many miscues, most of which resulted in sentences that did not make sense within the meaning of the story. For example, in an illustrated story about baseball, he signed "flying mammal" in response to the print word *bat,* and "swim" in response to *swing.* In the former he was prompted with the correct sign BASEBALL BAT. However, Billy's confusion persisted, and in the next occurrence of *bat,* he fingerspelled the word, suggesting that he did not have a sense of the word or the story. On the latter, he hesitated as he made the miscue, rechecked the print, did not self-correct, and signed "SWIM" again. Billy was unable to respond to the text as he read, did not indicate dialogue or represent character shifts, and failed to observe sentence boundaries or punctuation marks. Billy attempted to represent each English morpheme with a sign. He also made fluent and frequent use of SEE (Signing Exact English)[10] lexicon, including pronouns and copulas (HE, SHE, IS), although he used very few content signs from the SEE lexicon. He mapped ASL signs onto print words, but all were uninflected, and he did not use classifier predicates. As he struggled to decode every word, his pace of reading slowed.

[9]The names we use are pseudonyms.

[10]Billy's teacher employed a version of a pedagogical tool used by some educators to represent English vocabulary, called Signing Exact English (Gustason et al., 1980) and more commonly known by its acronym, SEE. This pedagogical tool offers a vocabulary book of devised initialized signs to be used in place of ASL vocabulary.