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ABSTRACT

To examine syntactic and semantic differences between the written language of deaf and hearing persons, 30 deaf students (10 Ss were 10 to 12 years old, 10 Ss 13 to 15, and 10 Ss 16 to 18) were asked to recall sentences. Ss' recall was compared to that of hearing control Ss matched for age. More than half (59.8%) of the total number of sentences recalled by deaf Ss violated rules of English grammar, syntax, or both; while only 9.7% of hearing Ss' errors did so. Deaf Ss also made more recall errors than control Ss. However, deaf Ss could use the semantic relations in English sentences as well as the hearing Ss did to aid in recall, suggesting that the deaf are able to take advantage of semantic information and coding strategies for processing a sentence whether or not these relations are realized in their syntactic rules. (CL)

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Deaf Readers' Comprehension of Individual Sentences

by

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A condensed version of this paper was presented at the International Convention of the Alexander Graham Bell Association of the Deaf, in Houston, Texas, as part of a Symposium, "Deaf Reader's Comprehension of Written Text," on June 26, 1980.

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Abstract

The deaf develop language skills later than and in a different manner than the hearing do. Evidence from this study indicates that the deaf develop syntactic patterns, constructions, and processing abilities for language which differ from those used by the hearing, but develop similar semantic patterns and processing abilities to the hearing. The development of early visual, gestural systems of semantic representation and implications for teaching reading to the deaf are discussed.

INTRODUCTION

Over the past dozen years, researchers (e.g., Goodman, 1967; Smith, 1971, 1973, 1975, 1977; Goodman and Goodman, 1977; Gibson and Levin, 1975; Wolf, 1977; etc.) have argued that reading involves psycholinguistic and cognitive activities, as well as visual ones. Similar to understanding speech, reading comprehension is an active psycholinguistic process dependent upon an adequate base of syntactic and semantic rules to help translate surface structure into meaningful information. The readers' psycholinguistic knowledge helps them to organize, process, and predict meaning from the visual information presented in printed sentences. This information is integrated, coordinated, and given a meaningful structure by their linguistic rule system.

Readers develop strategies to relate what they read to their linguistic base, to rapidly predict or recognize meaning consistent with these rules, and then to continue reading to ascertain that the prediction or recognition is an accurate reconstruction of the intended written message. In this way, readers use their base of linguistic knowledge, constraints, and redundancies to obtain meaning from the surface structure cues in print in a parallel fashion to their strategy for obtaining meaning from the surface structure cues in oral speech.

When we teach reading, of course, we presume a preexisting, intact, and adequately functioning linguistic system. But, as Truax (1978) has pointed out, children with hearing losses may not be able to supply the necessary linguistic prerequisites for reading. Indeed, as we know, studies (e.g., Furth, 1966a; Di Francesca, 1972; Conrad, 1977; etc.) have indicated that deaf students generally do not reach the same levels of reading achievement

or read as efficiently as hearing children. The role of the child's language structures for successful reading should not be underestimated.

According to current psycholinguistic theory, language is learned (in normally-hearing children) through a pairing of certain auditory sequences with the children's developing cognitive or environmental experiences. Gradually they learn an oral representation for things in their environment, and they learn to label, categorize, and code cognitive events for future use. For this to occur, there needs to be a continuous coordination between children's growing linguistic and cognitive systems.

By the nature of their sensory deficit, congenitally deaf infants cannot hear the auditory linguistic input from their immediate environment and cannot pair the linguistic input with their growing cognitive experiences. Whereas hearing children are continuously bombarded with auditory stimulation from the time they are born, deaf children only receive auditory language stimulation from the time their deafness is diagnosed and they are fitted with hearing aids. Unfortunately, there are still reported delays of up to 60 months until audiological assessment (Shah, Chandler, and Dale, 1978). Earlier than this, hearing-impaired children are limited to visual and/or tactile stimulation to associate with events in their environment. Frequently they develop an early visual or tactile representation for these cognitive experiences, as they either learn American Sign Language (ASL) another non-English (manual) language, or construct idiosyncratic communication systems.

It has been supposed that the linguistic base of deaf children may be different from that of normally-hearing children. Earlier studies (e.g., Templin, 1950; Myklebust, 1964, 1967; Simmons, 1962; Brannon, 1966; Brannon

and Murry, 1966; Elliott, Hirsh, and Simmons, 1967; Tervoort, 1967; etc.) described the surface structure of deaf subjects' written language; and they found it "inferior" to that of comparably-aged hearing subjects. Relying on such dependent measures as sentence length, sentence complexity, type-token ratios, frequency of parts of speech, and word orders, these studies concluded that the deaf subjects used a more rigid word order, repeated several basic stereotyped sentence patterns, and wrote shorter sentences, with a predominance of nouns and verbs.

More recently, there have been attempts to go beyond the analysis of immediate constituents and observed surface structure performance and to make inferences about the generative linguistic abilities that account for this performance. It has been reported that the deaf seem to have more difficulty with inflectional and derivational rules (Cooper, 1967; Raffin, Davis and Gilman, 1978; Crandall, 1978), the passive voice (Woodward, 1967; Tervoort, 1970; Power and Quigley, 1973; Presnell, 1973; etc.), certain verb units (Quigley, Montanelli, and Wilbur, 1976), relativized sentences (Quigley, Smith, and Wilbur, 1974), question formation (Quigley, Wilbur, and Montanelli, 1974), complementation (Quigley, Wilbur, and Montanelli, 1976; Jones and Quigley, 1979), pronominalization (Wilbur, Montanelli, and Quigley, 1976), conjunction (Wilbur, Quigley, and Montanelli, 1975), and negation (Quigley, Montanelli, and Wilbur, 1974) than the hearing. Some of these processes may follow a similar developmental pattern for hearing and deaf subjects, but be significantly delayed for deaf subjects. The processes of negation, conjunction, and question formation, for example, for older (18 year old) hearing-impaired children has been reported as similar to younger (10 year old) hearing children (Quigley, Montanelli, and Wilbur, 1974, 1976).

Quigley and associates have also reported that "deviant syntax," i.e., incorrect syntactic patterns not found in the language of hearing children, exists in deaf children's language production of relativized sentences, conjoined sentences, complement structures, questions, and their use of verbal auxiliaries, when using stimuli from the Test of Syntactic Abilities (Quigley, Steinkamp, Power, and Jones, 1979). None of these studies examined the sentential semantic structures or semantic relationships resulting from the reported syntactic differences.

An earlier series of studies by this author indicated that deaf subjects, ages 15-19, recalled sentences with grammatical structures that violated rules of English syntax, e.g., deletion of major sentence nodes, agrammatical word order, incorrect derivational and inflectional endings, etc., significantly more frequently than did hearing subjects (Sarachan, 1971, 1972; Sarachan-Deilly and Love, 1974). These studies tested deaf subjects who were either trained manually (ASL) or in the Rochester method (i.e., lipreading, fingerspelling, and oral speech), but who did not have formal preschool experience or hearing aid usage prior to entering residential schools for the deaf at age five. Similar results were later found with orally-trained deaf subjects who did have documented formal oral preschool and hearing aid usage from at least three years of age or earlier (Deilly, 1977).

It has been suggested (Menyuk, 1969; Mc Neill, 1970; Slobin and Welsh, 1973; Carrow, 1974; Schwartz and Daly, 1976; etc.) that sentence imitation can give valuable linguistic information concerning language. We tend to recall sentences that exceed immediate short-term memory span by using our linguistic rule system to organize and represent sentential content. Since

we recall sentences and meaningful language material differently than we recall lists of unrelated words, it is assumed that the semantic and syntactic rules of language provide an internal structure to aid our recall for linguistic materials. This is especially true for delayed recall of material, because the effect of the external model or stimulus becomes weaker over time, creating the need for some form of internal symbolic representation (Prutting and Connolly, 1976). It has been reported that information about a child's linguistic system can often be derived from the number and types of errors he or she makes in recalling stimulus sentences (Schwartz and Daly, 1976).

The nature of the semantic relationships in the written sentences of the deaf is not clear. The purpose of this study is to examine syntactic and semantic differences between the written language of deaf and hearing subjects. Since studies in the literature have demonstrated that people use syntactic and semantic relations in sentences to facilitate and organize sentences in recall, it was expected that examination of sentence recall by deaf and hearing subjects would reflect their use of basic syntactic and semantic structures. It is probable that the lack of early auditory exposure to English syntax in the deaf may result in impaired syntactic performance or inability to make use of syntactic strategies for recalling English sentences, when compared with hearing children. If, however, the gestural systems or other early language systems acquired by deaf children are sufficient for adequate coding of their growing cognitive experiences, it would be expected that they could learn and retain adequate semantic knowledge of their language through speech or reading.

METHODOLOGY

Population

The population sample for this study consisted of 60 subjects. Thirty subjects were congenitally and profoundly deaf and trained at a purely oral school for the deaf. All deaf subjects wore hearing aids and had the benefit of aural amplification and preschool oral training from at least three years of age. The other 30 subjects were normally-hearing subjects. Twenty subjects, ten from each population, were in the age range 10 - 12; twenty subjects, ten from each population, were in the age range 13 - 15; and, twenty subjects, ten from each population, were in the age range 16 - 18. Within each population, an equal number of males and females were tested.

Method

Each subject was given written instructions and an answer sheet. The instructions indicated that he or she would see 12 sentences, one at a time, flashed on a movie screen. Each subject was instructed to read the sentence, but only one time, and then to look at the number on the answer sheet in front of him or her. Starting with this number the subject was instructed to, "take away three, then, take away three more, and keep taking away by three's until tapped on the shoulder." "Taking away by three's" was adapted from Peterson and Peterson (1959), and was used as a form of rehearsal interference and to delay recall. When the subject was tapped on the shoulder, he or she wrote down the sentence on the answer sheet. All subjects were told that they could guess.

Each subject was given a chance to ask questions about the task and then given four warm-up sentences to practice on. These were scored im-

mediately. Each subject then had a second chance to ask questions about the task.

All subjects controlled their own reading rates by pressing a remote controlled "button" to advance the slide when they finished reading the sentence. Subjects were allowed 15 seconds to do the subtraction task, before being tapped on the shoulder, and then had as much time as desired to write the sentence. All words used in the sentences were from the Silverman-Dresner and Guilfoyle (1972) norms for words known by deaf children at age eight, at 89 schools for the deaf across the country. The stimulus sentences varied in length from five to nine words, and in syntactic construction from active, to passive, to negative, to passive-negative, to ensure a variety of sentences.

Scoring:

All recalled sentences were initially divided into two groups: (1) those recalled with errors; and (2) those recalled without errors. The first group of sentences was further divided into one of five mutually exclusive error categories, initially suggested by Kolers' (1970) study of reading, to help evaluate the results. The five error categories were:

- Error 1 -- errors resulting in a sentence which was both syntactic and meaningful, i.e., minor deletions, additions, or substitutions;
- Error 2 -- errors resulting in a sentence which was not syntactic but preserved the meaning;
- Error 3 -- errors resulting in a sentence which was anomalous (violated semantic constraints), but was syntactic;

Error 4 -- errors resulting in a sentence which was neither syntactic nor meaningful; and,

Error 5 -- deletion of half or more of the sentence.

Any sentence recalled with Error types 1, 2, 3, or 4 was further analyzed with respect to its semantic equivalency to the original stimulus sentence.

The criteria used to determine if the syntax or semantic content of the recalled sentence was acceptable were whether or not the resulting sentence would be judged as likely to be heard in spoken English, or if it would be "intuitively" grammatical to a native speaker of English. The criterion for semantic equivalency was whether or not the resulting sentence could be understood as having the same meaning as the model sentence. Three independent judges rated each sentence as to its syntactic and semantic acceptability and as to its semantic equivalency. Reliability coefficients (Scott, 1955) were obtained for acceptability ($r_{\text{deaf}} = .97$ and $r_{\text{hearing}} = .99$) and for equivalency ($r_{\text{deaf}} = .87$ and $r_{\text{hearing}} = .94$), indicating a high degree of agreement between judges and relatively unambiguous criteria.

RESULTS

Table 1 about here

All errors made by hearing and deaf subjects were summarized initially by error type, age level, and population. Descriptive analyses of the data reveals that most of the hearing subjects' errors (specifically 80.6%) of the total number of errors committed by hearing subjects resulted in sentences categorized as Error 1, i.e., sentences containing minor recall errors of addition, deletion, or substitution. Only four percent (4.3%) of

TABLE 1

Number and Types of Sentence Errors for
Hearing and Deaf Subjects for Three Age Levels

| Population | Error Type | | | | | Total Errors |
|------------------------------------|-----------------------|------------------|----------------|------------------|------------------|--------------------------|
| | I | II | III | IV | V | |
| Hearing | | | | | | |
| 10-12 years n = 10 | 26 (n=1) ^a | 3 (n=2) | 2 (n=1) | 1 | 4 (n=4) | 35 |
| 13-15 years n = 10 | 23 (n=7) | 0 | 1 | 0 | 3 (n=2) | 22 |
| 16-18 years n = 10 | 26 (n=9) | 1 | 1 | 0 | 2 (n=2) | 30 |
| Total Errors for Error Type | 75 (n=17) | 4 (n=3) | 4 (n=3) | 1 (n=1) | 9 (n=8) | Total Errors |
| % of Total Errors/Popn. | 80.6% | 4.3% | 4.3% | 1.1% | 9.7% | for Hearing Ss=93 |
| Deaf | | | | | | |
| 10-12 years n = 10 | 23 (n=8) | 33 (n=10) | 2 (n=2) | 11 (n=7) | 8 (n=5) | 80 |
| 13-15 years n = 10 | 16 (n=8) | 24 (n=9) | 2 (n=2) | 6 (n=4) | 4 (n=4) | 53 |
| 16-18 years n = 10 | 13 (n=8) | 28 (n=9) | 0 | 4 (n=3) | 10 (n=6) | 55 |
| Total Errors for Error Type | 52 (n=24) | 85 (n=28) | 4 (n=4) | 21 (n=14) | 22 (n=15) | Total Errors |
| % of Total Errors/Popn. | 28.2% | 46.2% | 2.2% | 11.4% | 11.4% | for Deaf Ss=184 |

12

13

^aNumbers in parentheses indicate the number of subjects committing this type of error.

the hearing subjects' errors were Error 2's or Error 3's, and all of these sentences were produced by just three hearing subjects. Only 1.1% of the hearing subjects' errors were categorized as Error 4, i.e., as sentences violating both English syntactic and semantic rules.

On the other hand, when the deaf subjects' errors were analyzed, just 28.2% of the sentences recalled with errors were Error 1's, but almost half (46.2%) of the total number of sentences recalled with errors by the deaf subjects were categorized as Error 2, and almost all deaf subjects (28 subjects out of the 30 subjects tested) produced sentences classified as violating the rules of grammar. Two percent (2.2%) of the deaf subjects' errors resulted in Error 3 sentences, and almost 12% (11.4%) of their errors resulted in Error 4 sentences.

When the performance of the deaf and hearing subjects is compared, it can be seen that more than half (59.8%) of the total number of sentences recalled with errors by the deaf subjects violated rules of English grammar, semantics, or both. Only 9.7% of the hearing subjects' errors violated English grammatical and/or semantic constraints, strongly suggesting that the psycholinguistic sentential relations in English are not used in the same manner by deaf and hearing subjects when recalling sentences.

Further, the relatively few recall errors produced by hearing subjects fairly consistently resulted in sentences classified as Error 1, i.e., minor errors of inexact recall. However, when the same sentence stimuli were presented to the deaf subjects, at the same age ranges, there were many recall errors produced, and these errors were distributed over the five types of error categories with Error 2 (errors violating English grammar) being the most predominant. A t test between means (Guilford and Fruchter,

1978) was performed on the numbers of sentences with errors violating English grammar (Error 2) between deaf and hearing populations. As expected, the deaf subjects made significantly more syntax errors than hearing subjects did ($t_{58} = 7.93, p < .001$).

Inspection of the data reveals that there is practically no variability between the performance of the hearing and deaf subjects when sentences recalled with semantic violations are examined. Both the hearing and deaf subjects produced only four sentences classified as Error 3, suggesting that the deaf subjects, could take advantage of the semantic relations in English to aid recall, in a similar manner to the hearing subjects.

Table 2 about here

All sentences recalled with Error types 1, 2, 3, or 4, by either deaf or hearing subjects, were totalled and re-examined with respect to their semantic equivalency to the original stimulus sentence. Sentences recalled with Error 5 (deletion of half or more of the sentence) were necessarily omitted from this analysis. Inspection of this data for hearing subjects reveals that 52.4% of their inaccurately recalled sentences preserved the meaning of the original sentence, while 47.6% of their sentences did not. Although the deaf subjects produced a greater overall number of sentences with errors, 54.9% of their inaccurately recalled sentences were semantically equivalent to the original stimulus, and 45.1% were not equivalent to the model; these differences were not significant ($p < .001$). Thus, despite the fact that the deaf subjects produced more sentences violating the rules of English syntax and/or semantics than the hearing subjects did, deaf subjects were equally likely to maintain accurate semantic content or

TABLE 2
 Frequency (and Percentage) of
 Semantically Equivalent and Nonequivalent Sentences
 Produced by Hearing and Deaf Subjects

| Population | Sentences Recalled With Errors I, II, III, IV | | |
|-------------------|---|----------------------------|------------|
| | Semantically Equivalent | Semantically Nonequivalent | Total |
| Hearing n = 30 | 44 (52.4%) | 40 (47.6%) | 84 (100%) |
| Deaf n = 30 | 89 (54.9%) | 73 (45.1%) | 162 (100%) |
| Total | 133 | 113 | 246 |

116

"gist" (Fillenbaum, 1968) of inaccurately recalled sentences as hearing subjects were.

DISCUSSION

As expected, results from this study indicated that these orally-trained deaf subjects, ages 10 - 18, could not take advantage of the syntactic rules in English to aid in the organization and recall of sentences as well as the hearing subjects did. Deaf subjects produced sentences violating English grammar (Error 2) significantly more often than hearing subjects; 46.2% of the deaf subjects' errors were of this type. Somewhat surprisingly, the deaf subjects could use the semantic relations in English sentences as well as the hearing subjects did to aid in recall. There were no differences between the number of sentences recalled violating English semantic constraints (Error 3) between deaf and hearing subjects. Furthermore, accuracy for the semantic content of a sentence did not seem to be related to hearing status; deaf and hearing subjects were equally likely to produce sentences that preserved the original semantic content of the stimulus sentence, even when the syntactic and/or semantic relations of the sentence were not preserved. This suggests that the deaf are able to take advantage of semantic information and coding strategies for processing a sentence whether or not these relations are realized in their syntactic rules.

As previously stated; depending on when the deafness is diagnosed, deaf children often experience a significant delay in English auditory language exposure, when compared with normally-hearing children. They also experience a lesser contact with and ability to use the aural stimulation from their parents to relate to their maturing cognitive and environmental ex-

periences. And, moreover, their primary language stimulation most frequently occurs through a different modality from normally-hearing children. Rather than learning language naturally from birth and from their environment, during their "optimal" or "critical" (Lenneberg, 1967) years for syntactic language acquisition, deaf children must frequently be taught English syntax (remedially) at some later age. Because there are so many differences in the initial early English language learning experience between deaf and hearing children, it is not too surprising that there are consequences for deaf children's reliable use of the syntactic rules of English. Even by age 18, the deaf subjects in this study still seemed to use some different syntactic rules that the hearing subjects did.

Recent studies have confirmed that conventional Sign language is indeed a language (c.f. Wilbur, 1979, for a comprehensive review and elaboration of these studies), and when it is introduced from birth, such as with deaf children of deaf parents, it may play a similar role to oral language in the development of cognition. It has been reported (Mc Intyre, 1977; Wilbur, 1979), that deaf children exposed to American Sign Language (ASL) from birth or deaf children simultaneously exposed to both ASL and English from birth (Wilbur and Jones, 1974; Prinz and Prinz, 1979) seem to pass through semantic stages and express all the semantic linguistic relations (Bloom, 1970, 1973) reported for hearing children learning oral languages.

But the development of these similar semantic functions in deaf children is not limited to those deaf children exposed to ASL. It has also been observed that young deaf children, without exposure to ASL or to any other obvious gesture language in their environment, develop an early spontaneous idiosyncratic gestural language, apparently based on their need to com-

communicate (Myklebust, 1954; Furth, 1966; Tervoort, 1967; Goldin-Meadow and Feldman, 1975). There is some evidence (Goldin-Meadow and Feldman, 1975) that even without systematic exposure to an obvious linguistic model, the development of this (symbolic) gestural communication system may contain early semantic stages similar to those that hearing children have been shown to experience and pass through while learning their verbal language. These authors (Goldin-Meadow, et al.) have hypothesized that deaf children may be able to abstract out lexical symbols from the actions they observe in their environment and use these symbols to represent growing cognitive schema in a similar manner to the hearing children's abstracting symbolic representation from sound. These early "esoteric" spontaneous gesture systems and combinations have also been shown to demonstrate similar pragmatic intentions (Skarakis and Prutting, 1977; Curtiss, Prutting, and Lowell, 1979; Wilbur, 1979) to those systems and combinations described and identified in the young hearing child's early communication (Dore, 1974; Greenfield and Smith, 1976)

It is suspected that the deaf child's early gestural communication systems, whether idiosyncratic or formal symbols, may adequately perform the functions of a sound-based symbolic system for him or her, as well as providing an adequate prelinguistic cognitive base for later semantic and pragmatic development. It should be recalled that hearing children develop gestures as normal precursors for spoken language, and it is suspected that these gestures may be prerequisites for full symbolic language representation to develop (Bates, 1976). The semantic/pragmatic foundation of early gesture systems is probably sufficient to generalize adequately to English for later semantic coding, representation, and sentence processing.

However, the syntax of these early gestural communication systems is often idiosyncratic; it is rarely an English syntax, which still must be taught later. And, if the optimal time for learning language ends at an early age, as Lenneberg (1967) has stated, then deaf children may have trouble learning their English-based syntax at this later age. Learning English syntax appears to be very difficult for deaf children. This may be because their first way of communicating, i.e., through spontaneously developing gestures, is not a fully articulated, or conventional symbol system with rules of ordering, and that there are difficulties in later transferring their system to the syntactic rules of English. Deaf subjects, from ages 7 - 18, seem to show developmental trends in acquiring their semantic relations, but not in acquiring their syntactic relations (Deily, 1977).

Even though all of the deaf children in this study were trained in a strictly oral school which prohibits the use of any visual language or signs; these children, at least until receiving their hearing aids, did not have an oral environment during their earliest months when so much cognitive learning and growth takes place. We must face the possibility that the reported differences cannot be ascribed to the training received by the deaf subjects, but rather to the fact that the training is necessary. Differences in the initial acquisition of English between the two groups of subjects when they were young may have created differences in their reliable use of English syntactic rules when they were older. There may be an interference when later learning English syntactic rules or, perhaps, the "critical" or "optimal" period for acquiring native syntactic competence may have been over. Perhaps all the modern instructional techniques, books, and methods may only have limited success and effectiveness when started at age two or three.

In the course of acquiring language, children internalize rules and later operate in accordance with these rules when speaking, comprehending, and processing language material. Implications exist for reading. As deaf children seem to have more difficulty utilizing the syntactic information in English sentences to aid in coding and processing sentences for retention than comparably-aged hearing children do, perhaps flexibility in selecting early reading methodologies is necessary. Semantic information seems to be very important when deaf children process a written sentence. Hence, the early use of paraphrase, reading-for-meaning, and other similar strategies placing primary emphasis on this component would take maximum advantage of these strengths and the apparent stability of the deaf children's semantic system. As Gormley and Franzen (1978) and Mc Gill-Franzen and Gormley (1980) have recently suggested, emphasizing the understanding or "gist" of an author's intended message may give better reading comprehension results than initially stressing control over syntactic structures, which may be difficult for some deaf children to achieve.

However, since both semantic and syntactic considerations are important for achieving full control of reading, it is also necessary later to teach syntactic constructions and attempt to make work endings, tenses, and other syntactic features perceptually distinctive and semantically relevant for deaf children. Many deaf children are able to omit certain derivational or inflectional endings from their oral and written speech and still retain sufficient semantic content to transmit an intended message. This study has documented that resulting "agrammaticisms" remain in deaf students' written language, despite varied teaching techniques, through the oldest ages tested (17 - 19 years). If deaf students cannot utilize the syntactic rules and

endings to help process sentences, they cannot extract precise meanings from these sentences, and total comprehension is weakened. Too often hearing-impaired children are said to have just a "reading" problem, when, in fact, they really have a broader "language" problem. Especially on the post-elementary level, continuing efforts to develop the English syntactic rule systems of deaf students should be maintained, to help make the perceptual characteristics of syntax salient for them.

From the evidence in this study, it seems apparent that the syntactic ability of mature deaf subjects in English differs from that of comparably-aged hearing subjects, as anticipated. The deaf develop their language skills later than, and in a different manner from the hearing, and, as a result, they seem to develop syntactic patterns, constructions, and processing abilities for language which are different from those normally used by hearing subjects. Contrary to expectations, however, neither the deaf subjects' sentential semantic structures nor their semantic processing of written language differed significantly from the hearing subjects. Possibly this similarity is due to deaf children's developing an early visual, gestural system of semantic representation, which may adequately generalize later to English. Performance on a memorial task which requires use of both syntactic and semantic rule-knowledge appears to demonstrate some of these differences. Thus, it seems important, initially, to use the semantic areas when teaching reading and language skills.

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