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THE CONTRIBUTION OF WRITING ON THE EFFECTIVENESS OF
LANGUAGE THERAPY FOR HEARING-IMPAIRED CHILDREN

By

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B.A., University of Montana, 1981

Presented in partial fulfillment of the requirements

for the degree of

Master of Arts

University of Montana

1989

Approved by



Chairman, Board of Examiners



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The contribution of writing on the effectiveness of language therapy
for hearing-impaired children (82 pp.)

Director: Michael K. Wynne, Ph.D. 

The purpose of this study was to compare the effectiveness of two language treatments for hearing-impaired children. Specifically, the hypothesis stated that if a hearing-impaired child received practice on certain morphologic structures in both written and oral language modes, then the child would master those language structures faster than if only oral practice had been provided.

Two school-aged, hearing-impaired children served as the subjects in this alternating treatments design. Each student received a language treatment which involved only oral practice, as well as a treatment which involved both oral and written practice. The treatments were counterbalanced between subjects and within subjects across time. The language targets of the study were the third person singular and possessive morphemes. Treatment protocol required that the students master the target structures at the sentence and paragraph levels. Mastery was defined as 80% correct production in three consecutive therapy sessions. After treatment was initiated, measurements of the students' use of the target structures were taken in structured probes of their spontaneous speech, as well as nonstructured conversational speech samples. In addition, a nontargeted language structure ("has") was measured before, during, and after treatment to serve as a control structure for the study.

The results differed for each subject. One subject demonstrated equal rates of acquisition of the targeted language structures regardless of the treatment method used. For the other subject, however, the oral/written combination treatment was a more effective therapeutic technique than the treatment which involved oral practice only. Both subjects demonstrated improvement in their use of the targeted language structures and no improvement in the control structure.

The conclusion was made that a combination treatment of oral and written language practice may be more effective than oral practice alone in developing oral language in hearing-impaired children. Until further research firmly confirms or discounts the effectiveness of a bisensory treatment approach, professionals may wish to consider using more bisensory stimulation with their hearing-impaired children.

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INTRODUCTION

A common belief among people is that when a person has a deficiency in any one of the five basic senses, the other senses become more sensitive or perhaps more trained. For example, if a person loses the sense of sight, then to compensate for that loss, the person might develop greater skill in using the sense of hearing. In fact, some research has shown that a blind person's central auditory processing abilities are significantly better than those abilities in a person with normal hearing (Starlinger and Niemeyer, 1981). However, these same researchers have shown no significant difference between blind and normal-sighted individuals in the peripheral functions of the auditory system. This study demonstrated that the body's sensory systems do indeed develop some compensatory abilities, and as was suggested by Starlinger and Niemeyer (1981), this compensation may be due to the plasticity of the brain. Based on the above research, one might then hypothesize a similar compensation process in a hearing-impaired person. If a person has a deficiency in hearing, then perhaps that person's visual skills become more refined. This hypothesis certainly has implications concerning handicapped children's learning patterns and the necessary techniques which would be most effective for therapy.

The implications relating specifically to the hearing-impaired

population and speech and language development are intriguing. If a child were profoundly deaf and unable to receive benefit from hearing aids, one could assume that the child could acquire information about the world, or learn, through the other available senses (vision, smell, etc.). This child then may develop a learning pattern using his remaining senses. The therapist or teacher, to be most effective, must understand how the handicap affects the child's learning and then implement those therapy/teaching techniques which will maximize the skills the child has in his remaining senses.

The articulation and language skills in the child with normal hearing are acquired and developed primarily through the use of the auditory channel. The sense of hearing provides the child not only with a medium for input of new information, but also with a means of feedback. That is, the child can learn speech and language structures primarily through the auditory channel, and then using the auditory channel again, he can practice and compare his own speech and language productions to those models he has heard.

Recent research by Meltzoff and Kuhl (1982) indicated that speech perception in infants also involves the integration of vision and audition. In addition, vision has been found to be an important factor in adults'

perception of speech (McGurk & MacDonald, 1976; MacDonald & McGurk, 1978). These studies have shown that, in order to perceive and understand speech, normal-hearing people use information received through both senses. The hearing-impaired person does not have the benefit of complete input from both senses and may rely more heavily on the visual information which is received.

When targeting articulation and language structures in the hearing-impaired population, the speech and language pathologist is especially challenged. Because a hearing-impaired child has an inadequate auditory system, many approaches assume the child must rely more heavily on other sensory information to learn speech and language. In addition, the hearing-impaired child has a reduced or eliminated auditory feedback mechanism in the learning process. The challenge, in most therapy approaches, is to teach speech and language skills through the specific techniques which will maximize the skills in the child's remaining senses. The therapist must also be acutely aware of the child's need for and the type of feedback system operating in the language learning process.

The present study attempted to address the issue of providing appropriate sensory therapy techniques and feedback to a hearing-impaired child. The researcher determined if using orthographic (written) language

practice as an additional tool in developing oral language was more effective than oral language practice alone. The rationale was that added written language practice may provide input via an intact sensory system and may also provide an avenue for feedback to the hearing-impaired child as a language learner.

The idea of using written language to develop oral language is not necessarily guided by classic developmental research. Generally, research in language development has shown that language skills are acquired and developed in their order of hierarchical difficulty. That is, receptive language skills are developed first, followed by oral expressive language skills, reading skills, and finally written expressive language skills (Myklebust, 1964; Huttenlocher, 1974; deVilliers & deVilliers, 1978). However, the hearing-impaired child may acquire language differently than the normal-hearing child and may therefore require different teaching/intervention strategies. In most hearing-impaired children, the receptive and oral expressive language skills are delayed. Most authors believe that the delay in the early language skills of these children will subsequently affect the development of later language skills such as reading and writing (Litowitz, 1981). Since written language is thought to be the last component in the language development hierarchy, it has not

traditionally been included in treatment procedures designed to improve oral language. However, because of the sensory deprivation, a hearing-impaired child's learning pattern for language may be atypical. A visual language form may provide the hearing-impaired child with more input and feedback and, as a consequence, language learning may be facilitated.

Thus, the current study attempted to determine if a difference exists in the effectiveness between two treatment procedures. Specifically, if a hearing-impaired child receives practice on certain morphologic language structures in both written and oral language modes, then the child will master those language structures faster than if only oral practice had been provided.

A REVIEW OF LANGUAGE DEVELOPMENT

IN HEARING-IMPAIRED CHILDREN

A review of the literature in the area of language development in hearing-impaired children can be confusing to a naive reader as hearing-impaired children may develop language visually, auditorally, or through any combination of these modes. Thus, researchers have studied the acquisition of oral, signed and written language forms. However, limited research is available in some modes of language development. In addition, researchers have used many different methodologies. Despite these limitations, a great deal of knowledge has been accumulated which aids one in understanding how language (in its various forms) may be acquired by hearing-impaired children.

Some terms must be defined before examining specific areas of the research in language development. A working knowledge of these terms is necessary to comprehend the literature on language development in the hearing-impaired population.

Definitions

Language. Language itself has been defined by many people and in many ways. A useful definition for the purposes of this study is one which was provided by Bloom and Lahey (1978). They described language as being a code whereby ideas about the world are represented by a conventional system of signals for communication. This definition allows for and describes all forms of language, including oral, manual and written language.

Linguists have determined that language consists of five components which determine the function, form and content of our language. These five components are pragmatics, phonology, morphology, syntax, and semantics.

Pragmatics is the study of the function and purpose of language within different communicative contexts (McLean & Snyder-McLean, 1978). People use language to communicate for a variety of reasons. If a person is able to use language to achieve a desired purpose, then the person is considered to have competence in communication. The child's ability to reach competence in communication depends on developing adequate pragmatic skills.

Language form is determined by the phonological, morphological and

syntactical components of language. Phonology is defined as the study of the sound system of the language--the segments or consonants and vowels, and suprasegmental tunings of intonation, stress, and pause (Bloom, 1980). Phonemes are the individual sounds in an oral language. Morphology is a second component in the form of language. Morphology is the study of the smallest units of language that carry meaning (Bloom, 1980). These units are called morphemes and include simple words as well as inflections such as "ing," "er," "est," "s," "es," etc. Syntax, the third component, is the system of rules which governs how words may be combined to form meaningful sentences (McLean, Snyder-McLean, 1978). Syntactic rules govern the ordering of words in sentences. Thus, the phonologic, morphemic, and syntactic rules all contribute to the form of language.

The semantic component provides the content or meaning of language. Semantics concerns the meanings intended by the use of particular syntactic forms and vocabulary (Kretschmer & Kretschmer, 1978).

Each of the above components of language build upon and interact with the other components. For this reason, to clearly isolate any one of these components in research or therapy applications is difficult. The complexity

of language contributes to the long, difficult process of its acquisition. However, as Kretschmer and Kretschmer stated, "It is through mastery of the interactions of syntactic, semantic, pragmatic, and phonological components that individuals are capable of producing and understanding sentences" (Kretschmer & Kretschmer, 1978, p. 4).

A hearing loss greatly impedes the development of all language components (Norlin & Van Tasell, 1980). This delay in language development occurs because a child simply is not exposed to the sounds and components of language through the auditory system.

Hearing-impairment vs. deafness. Two additional terms which require some clarification are "hearing-impairment" and "deafness." Quigley and Paul (1984) defined hearing-impairment as "a generic term covering all degrees and types of hearing loss, with deafness... being the extreme degree of impairment (90+ dB)" (p. 2). That is, all people with a hearing loss may be referred to as being "hearing-impaired." However, only those people with profound losses are considered to be "deaf." Quigley and Paul (1984) further described deafness as being those hearing impairments so great that, "even with good amplification, vision becomes the child's main link to the world and main channel of communication" (p. 1). Thus, people who are "deaf" (as

defined above) usually use a manual form of communication and socialize with other deaf people.

Modes of Language Acquisition

As stated earlier in this paper, the study of language development in hearing-impaired children is difficult. This is due to the different language input modes often used in the acquisition process. Kretschmer and Kretschmer (1978) stated that deaf children can be expected to be taught a first language through oral language, gesture language, read (sic) or written language. Despite the complication of various language input modes, researchers have been able to draw some conclusions about the development of speech and language skills in hearing-impaired children. These general conclusions are discussed in terms of acquisition of oral, gesture, signed and written language forms.

Oral Language Acquisition. Oral language involves communicating a message through the sounds of speech. When compared to signed, read and written language forms, oral language is obviously the least visual form of language. Thus, the reception of oral language relies most heavily upon the auditory system. Researchers who have studied the acquisition of oral language in hearing-impaired children have found significant language

delays. This suggests that the acquisition of this least visual form of language is indeed quite difficult for hearing-impaired children.

Norlin and Van Tasell (1980) discussed the relationship between oral language development and hearing impairment. After reviewing the literature, they formed three basic conclusions: "(1) Hearing-impaired children make characteristic errors in the use of language form; (2) hearing impaired children use the same strategies for rule-learning as normally-hearing children; and (3) breakdown in rule-learning may be related to severity of hearing loss" (pp. 21-24). These conclusions are discussed in further detail below.

Generally, various researchers have found that hearing-impaired children develop oral language at a slower rate, but in a similar sequence to that of normal-hearing children (Kretschmer & Kretschmer, 1978; Norlin & Van Tasell, 1980; Quigley & Paul, 1984). That is, most researchers have concluded that hearing-impaired children use the same basic strategies to learn the rules of language, regardless of its form. As will be shown later, the acquisition of the signed and written language forms show the same delayed, but sequentially similar, developmental pattern.

When a breakdown in the rule-learning strategy occurs, some

indication exists that the severity of the breakdown is related to the degree of hearing loss. Norlin and Van Tasell (1980) stated that "as a general rule, it seems that with an increase in the severity of hearing-impairment, children experience progressively greater difficulty in their capacity to extract and learn the rules of an oral language system" (p. 24). Furthermore, as hearing becomes more impaired, the need for visual feedback and an alternate system for learning language may become greater.

Hearing-impaired children make characteristic errors in the phonology of their oral language. Oller et al. (1978) and Dodd (1976) found that hearing-impaired children made phonological errors of substitution, deletion, and syllable reduction which were very typical of younger normal-hearing children. Recent research has also suggested that the intelligibility of a hearing-impaired child's speech is related to that child's language skills. Carney (1986) indicated that for each individual child, speech intelligibility varies as a function of the syntactic complexity of the utterance and the syntactic ability of the subject.

Development of oral morphology is also delayed in hearing-impaired children (Cooper, 1967). This language delay is thought to be related to the degree of hearing loss. Norlin and Van Tasell (1980) explained the reasoning

behind this concept by posing the hypothesis that if a hearing-impaired child cannot hear specific speech information, then that child will have difficulty learning and using the linguistic distinctions marked by this acoustic information. The researchers further explained that it is logical to assume that a child with a high frequency hearing loss may have difficulty learning to use morphological inflections such as plurals and possessives, since in English these form/content markers require the use of fricatives /s/ and /z/. These two fricatives are characterized acoustically by high frequency noise. Some research has demonstrated that these morphological endings can be acquired through manual English (visual) language forms (Raffin, 1976).

The development of syntax in the oral language of hearing-impaired children is consistently delayed. Norlin and Van Tasell (1980) found an overall reduction in the stability and complexity of hearing-impaired children's sentence structure. The typical errors produced by the children included the omission of "functor words." These functor words, which have no visible referents, are words such as prepositions, conjunctions, articles, etc. Norlin and Van Tasell attributed the omission of these functor words to the typically short and unstressed nature of these

words, as they, like morphological inflections, are more easily obscured than nouns and verbs. The authors stated that functor words are the most vulnerable when portions of the speech signal are lost. Hearing-impaired children also exhibit oral syntactical errors in verb usage, passive constructions, questions, conjunctions, complements and pronouns.

Semantic delays have also been documented in oral hearing-impaired children. However, the developmental sequence appears to be the same as that seen in normal-hearing children (Quigley & Paul, 1984, p. 88). Norlin and Van Tasell (1980) reported a notable delay in the development of vocabulary. They documented a reduction in the size and complexity of a hearing-impaired child's vocabulary which was not limited to one class of words. Skarakis & Prutting (1977) found that the development of semantic functions/relations in hearing-impaired children was delayed, but similar to the development of semantic functions/relations in normal-hearing children. Specifically, the same semantic functions seen in hearing children at 9 to 18 months of age were also seen in four deaf children, ages 2.1 to 4.3 years.

Studies on the development of pragmatics in oral hearing-impaired children are few in number. Still, the data suggest that the developmental

pattern of communicative functions in hearing-impaired children may be similar to the developmental pattern seen in normal-hearing children. Curtiss, Prutting and Lowell (1979) found that two-year-old hearing-impaired children can communicate a complete range of intents. These children used communication to command, protest, question, describe and summon, etc. One study, however, indicated that young hearing-impaired children are not as competent as normal hearing peers in their social communication (Gorrell, as cited in Kretschmer & Kretschmer, 1978). This study found that young deaf children approached one another less, responded to each other less, vocalized less, and attended more to themselves.

Gesture Systems Acquisition. The early research suggested that general similarities exist between gesture system acquisition and normal oral language acquisition (Feldman, 1975; Goldin-Meadow, 1975). More specifically, early gesture systems emphasize action strings rather than attribute strings. This is similar to early semantic development in normal-hearing children. Studies have also found that hearing-impaired children expand or develop increasingly sophisticated gestures to include various forms and serve various functions (Grewel, 1963; Skarakis &

Prutting, 1977). A gradual increase in sophistication of gestures is similar to the gradual development of form, function, and pragmatics in normal oral language development. Skarakis & Prutting (1977) observed each of the basic communicative intents in the gesture systems of four deaf children.

Some differences have been found between the development of a gesture communication system and the development of an oral language system. These differences may be conceptual in nature and related to formulation restrictions of a gesture language vs. an oral language. In gesture systems, certain concepts may be easier to portray than others. For example, gesturing the meaning "take" would be easier than gesturing the concept "real." Oral language is restricted, on the other hand, by strict word order rules (Kretschmer & Kretschmer, 1978). These differences in systems are summarized by Kretschmer and Kretschmer: "There are indications that the gesture systems of deaf children tend to be organized with semantic rather than word order focus, which may confound the learning of spoken English in hearing-impaired children identified at older chronological ages" (p. 94).

Sign Language Acquisition. Similarities between deaf children's sign language acquisition and normal-hearing children's oral language

acquisition have been documented across all of the components of language. Generally, several studies have shown that hearing-impaired children who are exposed to sign language develop language skills more slowly, but in a similar manner, to their normal-hearing peers (Collins-Ahlgren, 1974, 1975; Winslow, 1973 [cited in Kretschmer & Kretschmer, 1978]; Hoffmeister & Wilbur, 1980). Vocabulary development has been found to be delayed, but similar in the types of words acquired. In addition, the same communicative intents were seen in both deaf and hearing groups (Collins-Ahlgren; 1974, 1975).

The development of morphology appears to be dependent on the type of sign system used. Hearing-impaired children who are exposed to English sign systems may acquire morphemes more easily (Quigley & Paul, 1984). However, there is evidence that shows a 2-6 year delay in morphology development despite use of an English sign system (Raffin, 1976).

The development of syntax has not been studied extensively. However, recent data suggest that, in ASL, the development of negation and pronoun usage are similar to the stages seen in young normal-hearing children (Hoffmeister & Wilbur, 1980). Winslow's study (cited in Kretschmer & Kretschmer, 1978) indicated that deaf children often acquire

a rigid order of signs to express certain semantic meanings. This development of rigid order is similar to oral syntactic development in normal-hearing children.

Some evidence suggests that children who learn American Sign Language (ASL) as a primary language are not delayed in their overall language development. Bellugi & Klima (1972) and Schlesinger & Meadow (1972) reported that deaf children who learn ASL may be comparable to their hearing peers at the early stages of language acquisition. Charrow & Fletcher (1974) suggested that deaf children of deaf parents who learn ASL as their primary language often learn English as a second language.

The discussion above suggests that sign language development in hearing-impaired children may be similar in many respects to the oral language development in normal hearing children. However, it also indicates significant language delays in hearing-impaired children. These delays have been found in the development of vocabulary and semantic relations, morphology and syntax (Collins-Ahlgren, 1974-75; Quigley & Paul, 1984; Kretschmer & Kretschmer, 1978). These delays usually occur despite use of an alternate (visual) mode of learning language.

Written Language Acquisition. Since written language is a visual

form, some researchers believe that exposure to written language is a viable means for the hearing-impaired population to learn language.

Steinberg (1982) stated that one of the earliest efforts in written language instruction for deaf children was done by Alexander Graham Bell. Mr. Bell believed that reading and writing could be taught directly to the hearing-impaired without the means of speech. In 1883, Mr. Bell had some success teaching written language to a 5-year-old deaf boy. This success demonstrated that language structures could indeed be taught through a written mode. Mr. Bell's success also suggests that hearing-impaired children may indeed be able to learn language in a nontraditional manner. That is, perhaps hearing-impaired children do not have to follow the traditional language-learning hierarchy of auditory comprehension, oral production, reading and finally writing.

More recently, researchers have carefully studied the acquisition and use of written language by hearing-impaired children. Several studies have shown that young hearing-impaired children have an ability to acquire some aspects of written language naturally and without direct instruction (Conway, 1985; Ewoldt, 1985; Steinberg, 1982). For example, Steinberg (1982) found that significant written language knowledge, even of such

vastly different writing systems as English and Japanese, can be acquired directly through the medium of writing by very young children who have had a profound hearing loss at or near birth. This study provided evidence that some hearing-impaired children can learn to understand written language, that is; learn to read simple words, phrases, expressions and sentences, beginning as early as 17 months of age.

Conway (1985) studied young hearing-impaired children's natural development in the production of written language. He found that writing emerged early and evolved as a purposeful activity that could be used to fulfill personal and sociocultural needs. He concluded, therefore, that writing is not serial to, but coincidental with, the development of other modes of communication. This suggests that written language is not necessarily the latest-learned language form. This finding is in contrast to the findings of Myklebust (1964), Huttenlocher (1974), and deVilliers and deVilliers (1978) who stated that written language was the last, as well as the most difficult, language form to be developed.

Several studies have also examined the morphologic, syntactic, and semantic components of the written language of older hearing-impaired children. Overall, this research indicated that hearing-impaired subjects'

development and knowledge of written language is severely delayed. Still, the nature of the errors made by hearing-impaired subjects, although extremely delayed, was qualitatively similar to the developmental errors made by normal hearing subjects (Kretschmer & Kretschmer, 1978).

Quantitatively, the normal-hearing child generally produces more than his or her hearing-impaired peer in written language tasks (Yoshinaga-Itano & Snyder, 1985). Specifically, Yoshinaga-Itano & Snyder found normal-hearing children used longer clauses and sentences. In addition, normal-hearing children used more prepositional phrases and subordinate clauses.

Cooper (1967) studied deaf children's abilities to apply morphological rules to nonsense words in a written language form. His results revealed that the deaf subjects' performance in applying morphological rules was "markedly" inferior to normal-hearing children's morphological abilities. The patterns of difficulty, however, were similar between his deaf and hearing groups. Cooper also found that his deaf subjects' performances were more closely related to their reading and vocabulary levels. When he matched the deaf and hearing subjects according to equal reading abilities, the differences between the two groups' performances on the morphological test were much smaller. The large differences in performances appeared

only when the subjects were grouped according to chronological or mental age. Thus, one might assume that, for those subjects, the development of written morphology was related to the development of their reading skills, which in turn, may have been dependent on the methods used for teaching reading.

Looney and Rose (1979) compared hearing-impaired children's development of morphology in two visual language systems of fingerspelling and written language. These researchers instructed hearing-impaired students in morphological rules using two different communication methods. They presented material to one group using speech and fingerspelling. The other group received instruction through speech and written language. The results demonstrated no significant differences between the two methods of instruction, as both the fingerspelling (with speech) and written (with speech) modes were found to facilitate the acquisition of regular past tense morphological rules. The authors concluded, however, that their results demonstrated the merits of a programmed instructional approach. A programmed instructional approach was used with the two experimental groups, and the subjects within both experimental groups significantly improved their comprehension of regular

past tense morphemes in written language. Subjects in the control group, however, received no direct instruction and made no significant gains in comprehension of regular past tense morphemes. This study suggests that instruction which combines visual and oral language modes can facilitate acquisition of some language structures which are especially difficult to hear. Still, the study only measured the students' comprehension of when the structure was needed in a written sentence. Thus, the researchers only measured improvement of the target behavior in a very structured receptive task. These researchers did not examine the generalization of the target structure in oral language or use in spontaneous written language. Further measurements could have determined whether the students actually internalized the language structure and used it in their own oral and written language.

Delays in the syntactic development of deaf children's written language are well documented. A classic study by Heider & Heider (1940), revealed that deaf subjects' written language samples were less productive, as measured by shorter sentences, and less complex than those of their normal-hearing peers. These results were later confirmed by Simmons (1962) and by Myklebust (1964). In addition, deaf subjects' written

language appears to be less flexible in terms of sentence patterns and formations (Quigley & Paul, 1984). Kretschmer and Kretschmer (1978) concluded that deaf children depend highly upon surface structure organization in both comprehension and production of English written sentences. Deaf children most easily mastered the simple active declarative subject-verb-object syntactic arrangement. This was also the most often used sentence pattern in Kretschmer and Kretschmer's deaf subjects' written language.

An extensive study done by Quigley, Wilbur, Power, Montanelli, & Steinkamp (1976) revealed specific areas of strength and weakness in the written syntax of deaf subjects' between 10 and 14 years of age. Although all of the language components were severely delayed, Quigley et al. found that their deaf subjects demonstrated more difficulties with some syntactic forms as compared to other syntactic forms. Their deaf subjects' showed the fewest difficulties with use of personal pronouns, negation, and simple conjunctions (joining two sentences). In contrast, their deaf subjects demonstrated the most difficulties with verb and question forms, relative clauses, and complements. These results indicated the deaf subjects had the most difficulty with more complex syntactic structures.

A recent study by Yoshinaga-Itano & Snyder (1985) submitted new developmental information regarding the syntactic as well as the semantic skills in the written language of hearing-impaired children. The results of their study suggested that an interrelationship exists between syntactic and semantic development. The researchers confirmed a significant delay in their hearing-impaired children's written syntax. The hearing-impaired children used significantly fewer words per sentence or clause than their normal-hearing peers. The hearing-impaired children also used fewer subordinate clauses, indicating simpler sentence structure. However, these researchers also discovered that the development of the clause in both normal-hearing and hearing-impaired children proceeds linearly, improving with age. This data demonstrated a continued but gradual improvement in syntactic skills. Finally, Yoshinaga-Itano & Snyder further stated that this linear clause development appeared to peak at age 12.

The results of this study indicated a quadratic development of semantic skills. Measurements of the number of propositions or ideas in the hearing-impaired subjects' written language samples, showed a gradual chronological improvement in semantic skills up to age 12. Then the level of these skills was observed to decrease. This quadratic development was

also observed in normal-hearing children. However, in normal-hearing children the semantic skills improved up to age 13, then decreased between 14 and 15 years of age. The authors also found that the normal-hearing child used proportionately greater numbers of minor propositions than the hearing-impaired child. This finding indicated a more advanced semantic development in the normal-hearing children than in the hearing-impaired children. Yoshinaga-Itano and Snyder explained this finding further by stating that the difference in using major and minor propositions was directly related to the hearing-impaired child's relay of information in its simplest form, primarily the agent-action form. The hearing-impaired children rarely elaborated on a topic. The use of the agent-action form closely coincides with the hearing-impaired child's overuse of the syntactical subject-verb-object sentence pattern.

The results indicating semantic delays in the written language of hearing-impaired subjects were further confirmed when Yoshinaga-Itano and Snyder examined word choice. That is, they examined the kinds of words the hearing-impaired subjects chose in their written language samples. The researchers stated that synonyms were almost absent within the written stories of hearing-impaired children. The hearing-impaired subjects

seemed unable to choose different words to discuss the same topic. This finding is undoubtedly related to poor oral vocabulary development, which has been documented in hearing-impaired children (Norlin & Van Tasell, 1980).

Traditional Approaches to Language Habilitation in Hearing-impaired Children

The literature cited above indicates the presence of a severe language delay in hearing-impaired children. This language delay has been documented in all language forms. Traditional approaches in the habilitation of a hearing-impaired child's language have primarily focused on the method of communication, either oral or manual; and the remediation techniques, either structured or natural (Quigley & Paul, 1984).

Methods of Communication. The best method of communication to use in education for the deaf has been controversial since the introduction of formal education for hearing-impaired children in the 18th century (Quigley & Paul, 1984). Generally, three communication methods have been used in deaf education and language development:

1) The **oral method** stresses oral speech and speechreading as the means of language input for the hearing-impaired child.

2) The **manual method** of communication uses some form of sign language as the means of language input.

3) The **total communication method** is the method most clinicians have adopted for their work with hearing-impaired children. Total communication refers to a philosophy or system which permits any and all methods of communication to be used with deaf children (Quigley & Paul, 1984). In a total communication method all modes of language input are used (visual, auditory, tactile, etc.). Using all possible input modes is thought to give the child the best exposure to language, thus enhancing the chances for success in language habilitation. Total communication approaches typically use a combination of some sign system (visual) and oral speech (auditory) for language input. As written language is thought to be the language form which is the most difficult to learn, it has not been routinely included in oral language development procedures.

Methods of Instruction. Traditionally, there have been two main methods in language instruction: the natural method and the structured method. The **natural method** involves intense exposure to language in

naturalistic situations which are structured on the basis of the child's needs and interests. This approach attempts to parallel the ways in which hearing children acquire language. The goal is for the hearing-impaired child to acquire language inductively through intense exposure to appropriate language models (Quigley & Paul, 1984). In contrast, the **structured method** relies on formal instruction and a strictly sequenced curriculum. The students gain a metalinguistic knowledge of language, that is, they study language scientifically in order to become better language users.

Teachers and language therapists have often combined different methods of communication and combined methods of language instruction in their efforts to improve deaf education. Total communication is one example of a combined communication approach. Teachers sometimes use the natural instructional approach in early intervention/preschool years and a more structured approach by age 8 or 10 (Quigley & Paul, 1984, p. 12), thus combining instructional methods. The structured approach is often too difficult for very young children as it requires that they understand language terms such as "verb," "sentence," "phrase," etc. The children must be able to study language as an academic subject. Thus, the natural

approach is more often used with young hearing-impaired children. Later, however, as students gain a better understanding of language, they are capable of learning language rules through a much more structured approach.

As yet, research has not provided conclusive evidence that one method of instruction or communication is better than another. G. O. Bunch (1979) found, in a study on written language skills, that there was no significant difference between the performance of students instructed in the natural and structured methods (Bunch, 1979). Bunch & Clarke's study (cited by Bunch, 1979) found that the formal and natural methods are not differentially effective in the acquisition of written English morphological rules. Sarachan-Deily and Love (1974) also suggested that neither formal methods nor natural methods affect the language ability of deaf subjects without preschool training. This finding strongly indicates a need for early intervention with hearing-impaired children.

The research addressing the choice of the method of communication has also been less than conclusive. Three separate studies indicated that those hearing-impaired children who experience early, continuous manual communication are statistically significantly ahead of children who are only exposed to an oral communication approach (Meadow, 1968; Stuckless &

Birch, 1966; Vernon & Koh; 1970). These results are thought to provide evidence in support of a visual language input system. However, Bunch (1979) maintained that the chosen method of communication made no difference in terms of hearing-impaired children's functional language abilities. He concluded that researchers and educators have not yet created a method or combination of methods which will lead the average deaf child to an adequate command of English language. This view, unfortunately, appears to be true, especially when one considers that hearing-impaired high school graduates typically do not achieve reading and writing levels higher than the average, normal-hearing 4th or 5th grader (Steinberg, 1982). Thus, researchers and educators continue to seek methods of instruction and communication which are the most effective in language habilitation of the hearing-impaired. This study attempted yet another method of instruction and form of total communication in the habilitative process.

A Non-Traditional Approach to Language

Habilitation of the Hearing-Impaired

Traditionally, the therapy approaches for the development of oral language and written language have remained separate and distinct protocols. Staton (1985) specifically addressed this issue. She explained that traditional written language instructional approaches assumed that speaking must precede written language use and that writing must be taught gradually and in specific steps. Traditionally, then, oral language and written language have been developed separately. This theory served as the basis for written language education with normal-hearing children. Since this approach has had some success with normal-hearing children, it has also become the basis for written language education and therapy with hearing-impaired children.

Traditional approaches to teaching oral morphology (e.g. possessive /s/, plural /s/z/, etc.) have depended on the chosen instructional method. If a teacher or therapist selects the natural method, then the morphemic structure is modeled intensively in naturalistic situations. The child may then acquire the targeted structure through an inductive reasoning

process. In a traditional structured approach, the language form is taught through direct instruction. The child is directly taught the linguistic rules of why, when and where to use the targeted structure (eg. possessive /s/).

As stated in the introduction of this paper, the traditional approaches to language therapy may be ineffective for some hearing-impaired children. That is, since many of the hearing-impaired child's language errors occur simply because the child does not hear the complete language model, a natural approach, which relies heavily on modeling, may be ineffective for teaching certain language structures. A structured approach, however, may be too rigid. The student may not understand the importance of using language structures meaningfully, if the structures are only studied or learned in an academic manner.

The traditional language-learning hierarchy of auditory comprehension, oral production, reading, and finally writing may also be too rigid for planning an appropriate intervention program for some hearing-impaired children. Some researchers have suggested that the comprehension of language does not necessarily precede production, rather that there is an interaction between comprehension and production of language structures (Bloom, 1974; McConkey-Robbins, 1986).

McConkey-Robbins (1986) stated that during language development, an interaction occurs between the processes of language comprehension and production. She stated, for example, that a child may learn to understand a word by using it. Recent research has also suggested that traditionally later-learned language tasks such as reading and writing may be acquired by much younger children if given the opportunity (Conway, 1985; Ewoldt, 1985; Steinberg, 1982).

Hammermeister & Israelite (1983) stated the view that speaking, listening, reading and writing are closely related, and that this interrelationship should be considered in educational programming. They, in fact, discussed developing a reading and writing curricula based on an individual student's oral expressive language skills. Hammermeister & Israelite explained that the primary advantage to this approach is that the reading and writing materials are based on the student's own language base and experiences, and thus, these materials are more meaningful than commercial curriculum. These researchers also stated, however, that the disadvantage to using this approach with hearing-impaired children is that these children have significantly delayed expressive language skills. Thus, the expressive language base from which one could develop reading and

writing materials may be too limited to provide appropriate written language stimuli. Nevertheless, the merits of using all forms of language in an interrelated manner in education seem clear.

Many researchers have suggested that written language can be used as a means of teaching language to hearing-impaired children (Calvert, 1982; Cole & Paterson, 1986; Litowitz, 1981; Looney & Rose, 1979; Staton, 1985; Steinberg, 1982). The rationale behind this approach is provided by Steinberg (1982) who stated: "Given that a portion of the hearing-impaired population has problems in acquiring literacy through the medium of speech and sign it is proposed that such knowledge be acquired through the direct learning of written language" (p. 17). Steinberg also stated that using written language as a means of input provides three specific advantages to the hearing-impaired child:

- (1) "The learning medium is appropriate. Perception of written stimuli depends on vision, a medium in which the normal hearing-impaired have a full capability.
- (2) "Written language acquisition can facilitate speech. By learning written language, the syntax and vocabulary that underlie speech are also learned. Acquisition of such

knowledge reduces the burden of oral instruction.

- (3) "Written language acquisition is compatible with other approaches. Written language can be taught in conjunction with other approaches, such as oral or sign, without any injury to the integrity of those approaches."
(p. 18).

Calvert (1982) discussed the reasoning for using written language in teaching oral speech and reading to deaf children. He stated that written symbols were especially important for deaf children, because of their visual and static nature. He also contended that the unchanging, visual written symbol could be used as an aid for the deaf child trying to master speech. Specifically, he suggested that practice in writing a speech symbol in association with a particular speech sound, may give the child an associated visual target for remembering the sound and for a repeated oral production. Calvert also believed that the written symbol might then act as a prompt for the child to produce a given sound from memory. However, Calvert did not specifically test this hypothesis using written language and oral practice.

Steinberg (1982) also discussed the influence that written language

has on oral speech. He observed that in the early part of this century there was little interest in teaching written language, but that within the last decade there has been increased interest in using written language as a method in oral language habilitation. Steinberg commented that some advocates of the oral approach have also urged its inclusion into the oral curriculum. Steinberg stated that he had received personal communication from the Director of the John Tracy Clinic in Los Angeles, who admitted great merit in investigating the effectiveness of the written language approach in the oral curriculum.

Statement of the Problem

The literature cited above clearly documents that language development is delayed in hearing-impaired children. Furthermore, evidence suggests that traditional approaches to language habilitation have resulted in limited success in terms of functional language ability. Some research has indicated that the use of visual input, whether signed or written, can be of significant benefit in the language habilitation process. However, this research has not specifically addressed the issue of using practice in written and oral language as a means to develop oral language. While one

study (Looney and Rose, 1979) did indicate that combining written and oral language input improved comprehension of certain morphological structures in the written form, the researchers did not examine the effect of written and oral language instruction on production of oral language. The use of written language (visual) as an additional medium of language input may be an appropriate therapy technique for some hearing-impaired children.

Traditionally, speech-language pathologists and teachers of the deaf have not used written language as a tool for developing oral language skills. Rather, these clinician and teachers have taught specific written language skills in small, distinct steps in a separate approach from the development of other language skills. Their goals have focused on developing "writing" skills rather than improving overall language skills. This approach has been based on research which suggested a hierarchy of language skills based on the difficulty of the mode of communication proposing that receptive language skills develop first, followed by a development of oral expressive language, reading skills, and finally writing skills. Recent research, however, has suggested that, if given the opportunity, a child may develop higher level language skills such as reading and writing at much earlier ages than previously believed possible.

Researchers have not systematically examined, at least in the hearing-impaired population, the effects written language instruction may have on the language skills in other language forms. This type of research seems especially appropriate for hearing-impaired children. Depending on oral language input only, some of the auditory message may be lost to a hearing-impaired child. However, with written and oral language input, the message can be processed by two sensory systems, one of which is intact. The additional written message may provide a source of practice and feedback for the hearing-impaired child. Specifically, what effect would this additional practice in written language have on other language forms? Furthermore, how would written language instruction combined with oral language practice affect the oral language skills of a hearing-impaired child? With these questions in mind, the following hypothesis was presented: If a hearing-impaired child receives practice on certain morphologic language structures in both written and oral language modes, then the child will master those language structures faster than if only oral practice had been provided.

Methods

Subjects

Two hearing-impaired students enrolled in a total communication program served as subjects for this study. Table 1 contains a summary of subject descriptions. Subject A was a 13-year-old female with a severe-profound sensorineural hearing loss extending from 250-8000 Hz bilaterally. She wore binaural Telex 344 behind-the-ear hearing aids with lucite shell earmolds. At the time of this study Subject A's hearing aids were functioning within specification according to an electroacoustic analysis. Using this amplification system, Subject A's aided speech reception thresholds fell between 20 and 30dB HL. Subject A had been enrolled in a total communication program since age three, and at the time of this study, was mainstreamed full-time into regular 7th grade classes. She also received the services of a full-time interpreter, a notetaker for two lecture classes, and 2 1/2 hours of speech/language therapy per week. The most recent psychological evaluation revealed a nonverbal (performance) score in the above-average to superior range, as measured by the Wechsler Intelligence Scale for Children-Revised (WISC-R).

Table 1: Subject Descriptors**Subject A**

<u>Parameter</u>	<u>Performance</u>	<u>Equipment/Test Used</u>
1. <u>Hearing</u>		
Pure tone thresholds (Bilaterally)	80-100dB HL (250-8000Hz)	Amplaid 209
Aided SRT's	20-30dB HL range	
Aided speech discrim.	70% (binaural results)	
2. <u>Intelligence</u> (Nonverbal)	Above average (111) to Superior (129)	<u>WISC-R</u>
3. <u>Receptive language</u>	1-15% range	<u>PPVT-R, TOLD-I</u>
4. <u>Expressive language</u>	1-5% range	<u>TOLD-I</u> , Clinical observations
5. <u>Phonology</u>	Connected speech- 93% consonants correct	<u>PAT</u> , Clinical observations <u>PCC-Schriberg &</u> <u>Kwiatkowski</u>

Subject B

<u>Parameter</u>	<u>Performance</u>	<u>Equip./Test Used</u>
1. <u>Hearing</u>		
Pure tone thresholds (Left ear only)	40-60dB HL (250-750Hz) > 100dB HL (1K-8KHz)	GS1-16
Aided SRT's	40dB HL (left only)	
Aided speech discrim.	70%	
2. <u>Intelligence</u> (Nonverbal)	Average (93) to Superior (123) range	<u>WISC-R</u>
3. <u>Receptive language</u>	1-10% range	<u>PPVT-R, CELF-R</u>
4. <u>Expressive language</u>	1-10% range	<u>EOWPVT, CELF-R</u> Clinical observs.
5. <u>Phonology</u>	All phonemes except <u>/r/ /s/ /t/ /d/</u> ; 81% consonants correct in connected speech	<u>PAT</u> , Clinical observations, <u>PCC-Schriberg &</u> <u>Kwiatkowski</u>

LEGEND:

CELF-R = Clinical Evaluation of Language Functions - Revised

EOWPVT = Expressive One Word Picture Vocabulary Test

PAT = Photo Articulation Test

PCC = Percent consonants correct

PPVT-R = Peabody Picture Vocabulary Test - Revised

SRT = Speech reception threshold

TOLD-I = Test of Language Development - Intermediate

WISC-R = Wechsler Intelligence Scale for Children - Revised

Subject A used oral speech as her main method of expression. Sign language was not routinely used in the home. However, she relied on total communication (auditory and signed input) for the reception of language in the school setting. At the time of this study, her receptive language skills were significantly delayed (1-15% range) according to the Peabody Picture Vocabulary Test-Revised (PPVT-R) and the Test of Language Development - Intermediate (TOLD-I). Subject A's expressive language skills were also significantly delayed (1-5% range) according to the TOLD-I and clinical observations. According to the Photo Articulation Test (PAT) and clinical observations, Subject A correctly produced all phonemes in the English language in single words and in structured sentences. Subject A occasionally needed verbal reminders to produce the high frequency fricatives (/s/z/ʃ/tʃ/dʒ/) correctly while reading and during spontaneous speech. At the beginning of this study, she was observed to correctly produce 93 percent of consonants in her spontaneous speech (Shriberg & Kwiatkowski, 1982).

The second subject in this study, Subject B, was an 11-year-old female with a moderate-profound sensorineural loss in the left ear and a profound loss in the right ear. While Subject B's right ear was unaided, she

wore an Oticon E25P behind-the-ear hearing aid on her left ear with a vinyl shell earmold. At the time of this study Subject B's hearing aid was also functioning within specification according to an electroacoustic analysis. Recent audiometric tests indicated an aided speech reception threshold of 40 dB HL. She had been enrolled in a total communication program since the age of six and, at the time of this study, was mainstreamed full-time into a regular 4th grade classroom. She also received support services from a full-time interpreter, 1/2 hour per day of tutoring by a teacher of the hearing-impaired, and 2 1/2 hours of speech/language therapy per week. Subject B's most recent psychological evaluation revealed a nonverbal (performance) score in the average to superior range, as measured by the WISC-R. She used oral speech as her main method of expression. Sign language was not routinely used in the home. However, she relied on total communication (auditory and signed) for reception of language in the school setting. Subject B's receptive and expressive language skills were significantly delayed (1-10% range) according to the PPVT-R, Expressive One-Word Picture Vocabulary Test (EOWPVT), Clinical Evaluation of Language Functions (CELF) and clinical observations. According to the Photo Articulation Test (PAT) and clinical

observations, she produced all phonemes correctly except /r/ə/ɜr/ɪʃ/ɪʒ/ in single words and in structured sentences. She needed occasional reminders to produce the high frequency fricatives /s/z/ʃ/ correctly during oral reading and spontaneous speech. At the beginning of this study, she was observed to correctly produce 81 percent of consonants in her spontaneous speech (Shriberg & Kwiatkowski, 1982).

Procedures

Experimental Design. An alternating treatments design (Barlow and Hayes, 1979) was used to assess the effectiveness of two different treatment procedures. An alternating treatments design involves treating a behavior under two or more different conditions. The different treatments are both administered during the treatment phase, but they are alternated and counterbalanced for order effects. The purpose of this design is to determine which treatment condition is more effective in changing behavior. The alternating treatments design was used in this study to compare the effectiveness between two language treatment procedures: oral language production practice versus combined oral and written language practice.

Reliability. Interobserver reliability of dependent (probe) and independent (treatment) measures was provided through a second observer.

The second observer was the interpreter for the hearing-impaired program. The reliability observer was trained in scoring the occurrence of the targeted language structures prior to acting as an observer in this study. This training involved two steps: (1) She was first taught how to score the target morphemes by the speech pathologist; and (2) she was then required to achieve 90–100% accuracy in scoring an audio tape for the target morphemes. Reliability measures were obtained during every third treatment procedure and during every probe procedure.

Dependent Measures/Probe Procedures. Dependent measures were obtained through the use of a probe procedure designed to elicit the target language structures of 3rd person singular and possessive forms. These measures were obtained during the initial baseline period and during every other treatment session. The subjects' responses were scored as correct or incorrect and then converted to a percent correct score for each probe sessions.

The probe procedure was used during the basal period to determine the pretreatment level of performance. Baseline data were collected through the probe procedure in 3 sessions to determine the subjects' spontaneous expressive use of the target morphemes. Baseline stability

was defined as no more than an average of 20% variation (within the basal period) in the accurate use of the target structures. In addition, basal stability required that the subjects' plotted performance not reveal a consistently rising slope.

The dependent measures were also taken during every other treatment session in order to monitor the subjects' progress through generalization of the language structure to spontaneous speech. To insure valid assessment of generalization of the language rules, different lexical items were targeted during the probes than were targeted during the treatment procedures. See Appendix A for a list of the specific lexical items selected for probes and those selected for treatment targets.

Picture stimuli were used to elicit the probes and obtain the dependent measures. To elicit the 3rd person singular morphemes, picture stimuli were used along with the signed/verbal instructions of "Tell me what happens in this picture" or "Tell me what the people do in this picture." The picture stimuli consisted of color pictures, each of which depicted at least 10 different actions. The targeted action (verb) areas were identified by numbered dots on a specific area or person of the picture. Thus, in each probe picture, there were at least 10 opportunities for 3rd person singular

to occur. If the subject responded by using a semantically appropriate and syntactically correct form which was not the target, the investigator prompted by saying, " Can you think of another way to say it?" For example, the target action word depicted may have been "runs" and the child responded with "The girl is running." In this case, the clinician asked the subject if she could think of another way to say it. If the subject did not provide the targeted response, then the response was scored as semantically and syntactically correct and a notation was made that the targeted response did not occur during that opportunity.

To elicit the possessive morphemes, picture stimuli were used in conjunction with the signed/verbal instructions of "Tell me about this picture" or "Using complete sentences or a short story, tell me whose things these are." These picture stimuli consisted of color pictures, each of which showed 10 different people holding or possessing some object. The target areas for the possessive forms were also identified by numbered dots on the picture stimuli. Thus, in each probe picture, there were at least 10 opportunities for a possessive morpheme to occur. If the subject responded by using a semantically appropriate and syntactically correct form which was not the intended target, the clinician prompted the subject by saying

"Can you think of another way to say it?" For example, the targeted possessive may have been "woman's hat" and the subject responded with "The woman has a hat." In this case, the clinician asked the subject if she could think of another way to say it. If the subject did not provide the targeted response, then the response was scored as semantically and syntactically correct, and a notation was made that the targeted response did not occur during that opportunity.

Independent Measures/Treatment Procedures. The subjects were seen individually three times per week in a school setting. Each session lasted approximately 30 minutes and included 15 minutes of both treatment procedures. One treatment condition (Treatment 1) consisted of oral practice only on the targeted language structure. The other treatment condition (Treatment 2) consisted of oral and written practice on the targeted language structure. The two treatment conditions were counterbalanced for order effects across time periods; that is, Treatment I was presented first in the first treatment session followed by Treatment II. The order of the treatment presentation was then reversed for the second and subsequent sessions. The two treatment conditions were also counterbalanced across subjects. Specifically, Subject A received oral

practice only (Treatment I) on the possessive morpheme, while Subject B received oral and written practice (Treatment II) on this language structure. Subject A, therefore, received oral and written practice (Treatment II) on the 3rd person singular morpheme, while Subject B received oral practice only (Treatment I) on this language structure. A general schedule for the treatment sessions with provisions for counterbalancing is presented in Appendix B.

Specific procedures for each treatment condition are presented in detail in the following discussion and outlined in Appendix C. In addition, the specific lexical items which were selected as treatment target are shown in Appendix A.

In the treatment condition of oral practice only (Treatment I), the first step consisted of the speech pathologist giving oral/signed instructions to the student regarding the target language structure. These instructions were repeated at the beginning of each oral practice treatment condition throughout the treatment phase (see Appendix D for exact instructions). After these instructions were given, the speech pathologist used picture stimuli combined with oral and signed language to model five sentences with the target language structure. The Verb Concepts picture

cards published by Teaching Resources Corporation were selected as the stimuli for this step. The student was not required to respond to the modeled sentences. The third step of the oral practice treatment condition required that the student practice 15 sentences with the target structure orally. Picture stimuli and targets were chosen from the Teaching Morphology Developmentally program published by Communication Skill Builders. The speech pathologist gave oral/signed feedback to every student response. The student was told whether she had or had not used the target structure correctly in her oral production. The subjects' oral sentence productions were scored by the speech pathologist according to accuracy of use of the target morphemes. These scores were then converted to a percentage of correct responses for step three for each session. The student was required to achieve 80–90% accuracy in 3 consecutive sessions before proceeding to step 4. In the fourth and final step of the oral practice treatment condition, the subjects practiced the target morpheme orally in a short (5 sentence) spontaneous paragraph. Picture stimuli from sequence cards were used to elicit the target structures in this treatment step. The speech pathologist again provided feedback following each sentence within the paragraph as to the accuracy of use of the target morpheme. Each

student response was scored as correct or incorrect, and then a percentage of correct responses was calculated for step four for each session. Mastery of the language structure during treatment was defined as at least 80-90% accuracy in short oral paragraphs in 3 consecutive sessions.

In the oral/written practice treatment condition (Treatment II) the first step consisted of the speech pathologist providing oral/signed instructions to the student regarding the target language structure (see Appendix D for exact instructions). These instructions were repeated at the beginning of each Treatment II condition throughout the treatment phase. The second step of the oral/written practice treatment consisted of the speech pathologist modeling five sentences using the target language structure. These models were presented via a combined oral/signed and written language mode along with picture stimuli provided by the Verb Concepts cards from Teaching Resources Corporation. The student was not required to respond to the models. In the third step of this treatment condition, the student wrote and then orally read 15 sentences using the target language structure. Pictures from the Teaching Morphology Developmentally program served as stimuli for this treatment step. The speech pathologist provided verbal/signed feedback to each of the subject's

responses as to the accuracy of her written and oral productions. In addition, the speech pathologist scored the written and oral productions for accuracy in use of the target morphemes. These scores were converted to a percentage of correct responses for step three for each session. The student was required to achieve 80–90% accuracy (in three consecutive sessions) in the written and oral productions before proceeding to the final step. In the fourth and final step of the oral/written treatment, the student practiced the target language structure by spontaneously writing and then orally reading short paragraphs (consisting of a minimum of five sentences). The stimuli for this step were provided by sequence cards. The speech pathologist scored the student's productions for the accurate use of the target morpheme in both the written and oral forms. These scores were converted to a percentage of correct responses for step four for each session. Mastery of the target structure in treatment was defined as at least 80–90% accuracy in three consecutive sessions in both the written and oral modes.

Extratherapy Measures. As an additional method of dependent variable measurement, three spontaneous language samples were taken during the course of this study; one before the treatment procedures were initiated,

one in the middle of the treatment process, and one after treatment was completed. These spontaneous language samples allowed a more naturalistic method of analysis than that provided by the probe procedures, which were more structured. The spontaneous language samples assessed the learning and generalization of the target language forms to free spontaneous speech. These samples also compared the effects of treatment on the target language structures versus a control language form ("has"), which received no treatment. This comparison was made to determine if treatment was more effective than no treatment and to serve as a control for the influences of maturation and education.

Results

This study investigated the effectiveness of two clinical procedures to remediate the 3rd person singular and possessive language forms in hearing-impaired children. Specifically, if a hearing-impaired child receives practice on these morphologic language structures in both written and oral language modes, then the child will master those language structures faster than if only oral practice had been provided.

Performance

The raw data indicating reliability and performance during baseline, treatment, structured probes and conversational probes are shown in Table 2 for Subject A. These same data for Subject B are shown in Table 3. The performance data for subjects A and B are illustrated in Figures 1 and 2 respectively.

Baseline. Baseline measurements of the subjects' use of the 3rd person singular and possessive language forms were taken before treatment began. A stable baseline was defined as no more than an average of 20% variation within the basal period and no consistent improvement in performance. Baseline stability was achieved within three sessions by each subject.

Table 2: Raw data for Subject A.

Series	3 rd Person	Possessive	Correct Non-Target		Control	Reliability
			<u>3rd</u>	Poss.		
Baseline						
Session 1	9% (1/11)	38% (5/13)	11	3		94%
Session 2	11% (1/9)	10% (1/10)	16	6		88%
Session 3	0% (0/1)	0% (0/4)	14	6		82%
Treatment						
Sentences						
Session 4	O: 93% (14/15) W: 100% (15/15)	73% (11/15)				
Session 6	O: 100% (15/15) W: 100% (15/15)	93% (14/15)				
Session 7	O: 100% (15/15) W: 100% (15/15)	93% (14/15)				100%
Session 8	O: 100% (15/15) W: 100% (15/15)	93% (14/15)				
Paragraphs						
Session 10	O: 100% (9/9) W: 88% (8/9)	82% (9/11)				
Session 11	O: 100% (6/6) W: 100% (6/6)	100% (12/12)				93%
Session 12	O: 100% (19/19) W: 80% (15/19)	85% (17/20)				
Probe						
Session 5	0% (0 attempts)	88% (7/8)	12	4		100%
Session 7	0% (0 attempts)	25% (1/4)	13	12		91%
Session 9	70% (7/10)	53% (8/15)	12	0		93%
Session 11	93% (13/14)	92% (11/12)	2	0		96%
Extra Therapy						
Pre	27% (17/63)	43% (3/7)			33% (1/3)	
Mid	61% (28/46)	100% (5/5)			58% (7/12)	
Post	60% (31/52)	82% (9/11)			18% (2/11)	

Table 3: Raw data for Subject B.

Series	3 rd Person	Possessive	Correct Non-Target		Control	Reliability
			3 rd	Poss.		
<u>Baseline</u>						
Session 1	10% (1/10)	0% (0/3)	11	12		85%
Session 2	6% (1/17)	33% (2/6)	15	6		91%
Session 3	12% (1/8)	0% (0/0)	15	12		81%
<u>Treatment</u>						
<u>Sentences</u>						
Session 4	87% (13/15)	O: 93% (14/15) W: 100% (15/15)				
Session 6	100% (15/15)	O: 100% (15/15) W: 100% (15/15)				
Session 7	93% (14/15)	O: 87% (13/15) W: 93% (14/15)				100%
<u>Paragraphs</u>						
Session 8	66% (6/9)	O: 33% (1/3) W: 100% (3/3)				
Session 9	55% (6/11)	O: 86% (6/7) W: 86% (6/7)				
Session 10	88% (23/26)	O: 100% (6/6) W: 100% (6/6)				100%
Session 11	83% (5/6)	O: 83% (5/6) W: 100% (6/6)				
Session 12	88% (7/8)	O: 100% (6/6) W: 100% (6/6)				
<u>Probe</u>						
Session 5	43% (4/7)	60% (3/5)	16	9		88%
Session 7	29% (2/7)	67% (6/9)	10	18		82%
Session 9	0% (0 attempts)	80% (8/10)	19	4		91%
Session 11	18% (3/17)	100% (9/9)	2	10		84%
<u>Extra Therapy</u>						
Pre	3% (1/37)	11% (1/9)			64% (9/14)	
Mid	28% (10/36)	56% (5/9)			75% (3/4)	
Post	32% (11/34)	85% (6/7)			0% (0/9)	

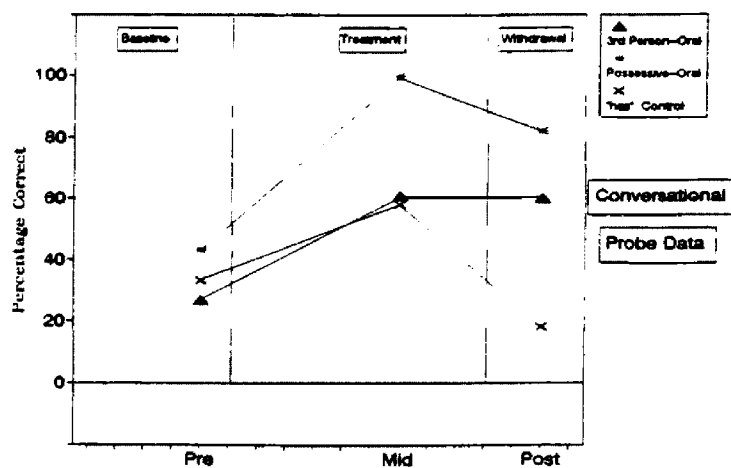
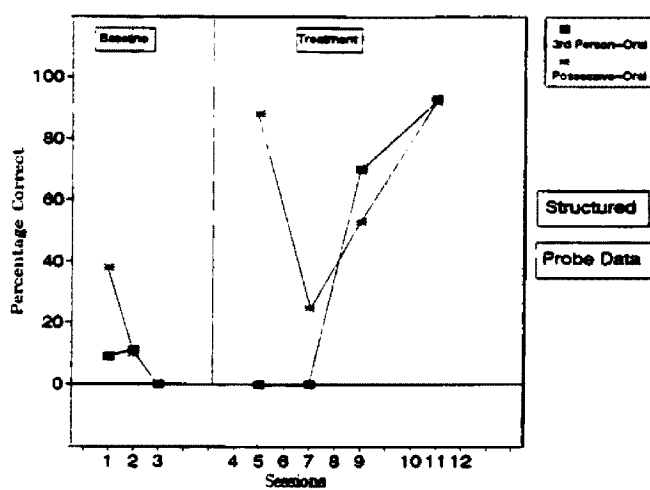
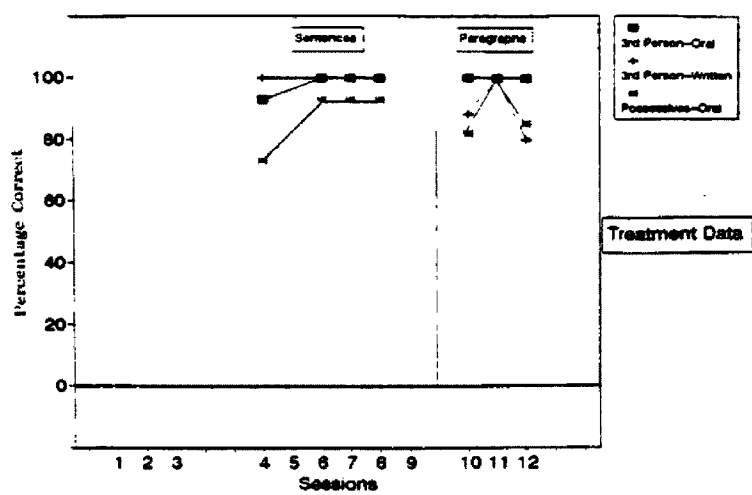


Figure 1: Number of correct target productions during treatment, structured probes, and conversation for Subject A.

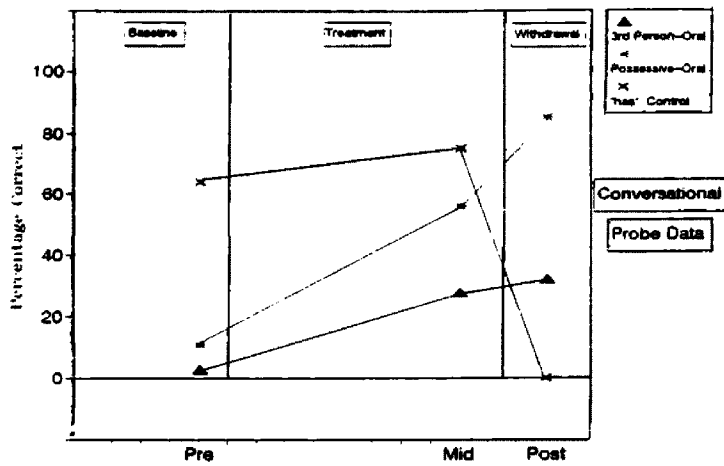
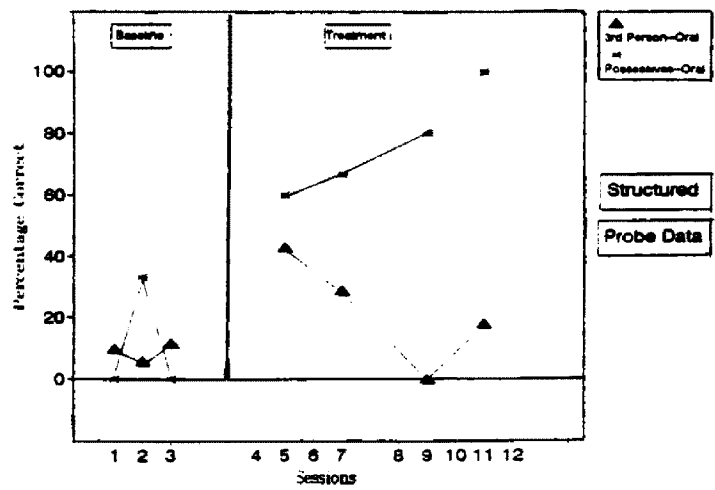
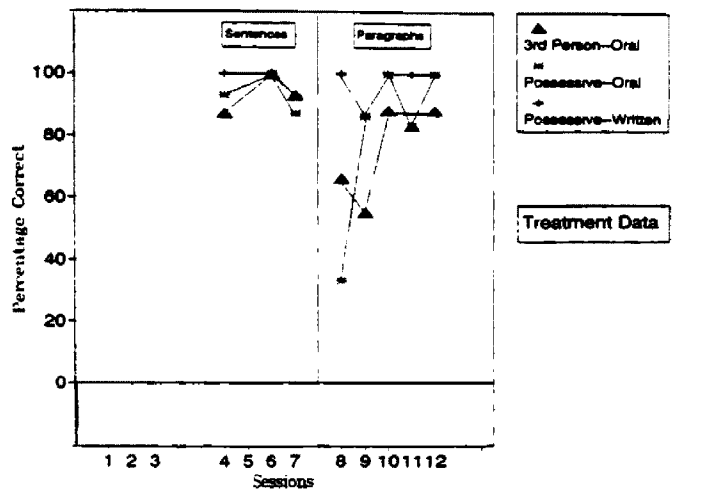


Figure 2: Number of correct target productions during treatment, structured probes, and conversation for Subject B.

Treatment. Steps one and two of the treatment procedure involved instructions and modeling and did not require the subjects to respond. Therefore, no data were collected during these treatment steps. Data were collected during steps three (sentence level) and four (paragraph level) of the treatment procedure. Each subject was required to achieve 80–90% accuracy in three consecutive treatment sessions before proceeding to the next treatment step. Both subjects achieved criterion in three to five treatment sessions for both the sentence and paragraph levels.

Structured probes. After the treatment phase was initiated, structured probe measurements were taken every other session to monitor the subjects' progress in learning and using the target language forms. During the structured probe procedures the subjects often chose to describe the probe picture using a language form different than the target form (e.g. "The girl is playing" instead of "The girl plays"). For informational purposes, these correct nontarget utterances were also tallied for each subject during the baseline and structured probe procedures. The correct nontarget utterances (semantic equivalents) were not considered when figuring the percentage of correct responses during a baseline or structured probe session. Only the target responses served as the basis for the

percentage correct data and these are the responses illustrated in Figures 1 and 2. During the treatment period, both subjects reduced the number of 3rd person singular nontarget utterances. Subject A also reduced the number of nontarget utterances for the possessive form, while Subject B continued to use many correct nontarget utterances during the possessive probes.

The structured probe data reveal that Subject A improved her use of both target language structures during the treatment period regardless of whether she received oral practice only or both oral and written practice. In addition, she gradually reduced her use of the nontarget utterances. The structured probe data for Subject B indicated rapid improvement in her use of the possessive form which received the oral/written treatment. The structured probe data for Subject B's use of 3rd person singular indicated that the oral treatment was not as effective as the oral/written treatment. In fact, the structured probe data indicates that Subject B's performance on 3rd person singular actually decreased over time. In contrast, however, the conversational probe measures taken on Subject B's use of 3rd person singular indicated she made gradual improvement on this language structure.

Conversational probe data. Three spontaneous language samples were

taken during the course of this study to provide additional data regarding the learning and generalization of the target language forms to free spontaneous speech. The results from these samples indicated that, with therapy, both subjects improved in their use of the target language structures.

These samples also compared the effects of treatment on the target language structures vs. a control language form ("has"), which received no treatment. These scores indicated that, without therapy, neither subject improved her use of "has." In fact, the data indicate that both subjects decreased their accurate use of this language structure.

Reliability

All reliability measures were taken "on-line," that is, during the subjects' original productions. For both subjects, the interobserver reliability measurements for the treatment sessions (independent data) fell between 93-100%, while the interobserver reliability measurements for the baseline and structured probe procedures fell between 80-100%. These reliability measurements were judged to be adequate.

Discussion

This study addressed the following research question: For a hearing-impaired child, is the treatment of combining oral and written practice more effective than using oral practice alone to improve spontaneous oral language skills?

The results for Subjects A and B differed as to whether the oral/written treatment was more effective than the oral treatment alone. The results for Subject A indicated that neither treatment was necessarily more effective than the other. This subject demonstrated essentially equivalent improvement in using both language targets regardless of the treatment approach used. Subject A also showed equal rates of improvement; that is, she improved her use of possessives just as rapidly as she improved her use of 3rd person singular. Thus, the combination of written and oral practice did not appear to enhance the therapeutic process for this particular subject.

In contrast, the results for Subject B indicated that the combination of written and oral practice was indeed more effective than oral practice alone. Subject B made consistent and rapid progress on the possessive language target which received the bisensory treatment approach. However,

the results on her use of 3rd person singular (oral practice only) indicated only a slight improvement in using this language target in free spontaneous speech. Thus, for this particular subject, the target which received the oral/written practice clearly improved more rapidly than the target which received oral practice only.

Several variables may account for the different results between these two subjects. These differences in results may be related to the level of difficulty of the language targets. The possessive morpheme is developed earlier in normal-hearing children and thus, may be a language structure which is easier to learn (Wood, 1976). Conversely, third person singular is developed later in normal-hearing children and may be a more difficult language structure. Since Subject A received the combination treatment on the more difficult language structure (3rd person singular), she may have progressed more rapidly than if she had not received this bisensory treatment. Although she received the oral-only treatment on the possessive language form, her correct use of this form may have progressed rapidly as it is an easier and earlier-developing language form than 3rd person singular.

Another factor which may have affected the results is the difference

in the subjects' ages. Subject A was older and had been exposed to more structured language learning in her classrooms. Her skills in studying and learning language may have been more advanced than Subject B's language learning skills. In addition, she may have been more cognitively "ready" to learn the targeted language structures. With a high degree of readiness to learn, any direct teaching approach may have been equally as effective for her learning a new language form. Looney and Rose (1979) made a similar conclusion from their research results. They found no differences in the performances of hearing-impaired students who received two different bisensory treatments (fingerspelling/speech and written/speech). They did, however, conclude that a programmed instructional approach was more effective than not providing any direct instruction of the language targets. Their conclusion is also consistent with this study's findings that the direct treatment of a language delay is more effective than no treatment at all in remediating certain language structures in hearing-impaired children's verbal expression.

The difference in the subjects' aided hearing also may have affected the results. Subject A's aided hearing is better than Subject B's aided hearing on conventional sound field measures. As Subject A may receive

more information through the auditory channel, the oral treatment may be more effective for her than for Subject B. Conversely, as Subject B's aided hearing thresholds are poorer than Subject A's, she may require more visual input and practice for the most efficient learning.

Since the two subjects performed differently, the conclusion cannot be made that the oral/written treatment was more effective in improving oral spontaneous language than the oral-only treatment. However, the additional written practice did not hinder progress, and in the case of one subject, the additional practice actually enhanced progress. This enhancement concurs with Steinberg's (1982) and Calvert's (1982) suggestion that written language acquisition can facilitate speech development.

This study's results also supported Steinberg's (1982) proposal that written language instruction is compatible with other instructional approaches. The combined oral/written instructional method was at least as effective, and possibly more effective, than the oral instructional approach. Finally, these findings provided evidence for Hammermeister and Israelite's (1983) position that listening, speaking, reading and writing are all closely related, and that all of these language areas should be

coordinated into the teaching practices of an educational curriculum.

Clinical Implications. The results of this study suggest that a combination treatment of oral/written practice may be a more effective oral language treatment procedure than oral practice alone for some hearing-impaired children. Therefore, clinicians and teachers may consider using written language in conjunction with oral language practice more frequently in their treatment protocols. The additional written language practice could also provide benefits to the development of the child's written language skills. The improved oral and written language skills could then ultimately lead to an improvement in overall language skills and academic performance.

In addition, this study's results indicated that written language instruction can be compatible with oral language instruction. This finding suggests that teachers and clinicians who work with hearing-impaired students might reconsider the structure of the language-learning hierarchy. Perhaps written language instruction could be incorporated much earlier in the therapeutic process than what is now commonly accepted. Conway (1985) found that young hearing-impaired children will use their writing skills to fulfill various personal and social needs. If written language

instruction were combined with oral language instruction at a younger age, this combined language therapy could be more efficient and effective than the traditional approach of using oral instruction before written instruction.

Finally, as expected, the results of this study found that providing treatment designed to improve oral language was more effective than providing no treatment for an oral language delay. This finding suggests that clinicians should carefully itemize those language behaviors which require treatment. Furthermore, the clinician should document the improvement in language performance (or lack thereof). This documentation would enable the clinician to continually monitor the program's efficacy and effectiveness. It would provide the clinician with information for making any necessary adjustments in the student's language development program.

Research Needs. Further research is clearly needed in the area of language development in the hearing-impaired population. The finding that hearing-impaired high school graduates typically attain only a 4th-5th grade reading level requires professionals to continue searching for the most effective language instruction method. Determining which instructional method is the most effective for each hearing-impaired child

would result in a more efficient habilitation program, as well as promote higher overall language skills in these children. The students' higher overall language skills should then result in better overall academic performance.

Combining written and oral language practice at a young age may be more beneficial in improving overall language skills and academic performance than using oral language instruction alone. Still, additional research is needed with subject groups of different ages to determine if written language intervention facilitates spontaneous oral language development and production for most school-age hearing-impaired children. Future studies should control for age and academic experience of the students to investigate the relationship between these factors and performance outcomes when a bisensory treatment approach is used.

Further research is also needed to determine what effect the degree of hearing loss has on the bisensory treatment approach. Perhaps students with moderate hearing losses do not "need" the additional visual input to improve their language skills. In contrast, students with both peripheral and central hearing losses may require additional visual input to improve their language skills.

Many questions remain unresolved at this time. How do various

factors such as age, academic experience, and degree of hearing loss affect the need for a bisensory treatment approach in language habilitation? How does a combined oral/written treatment approach affect a hearing-impaired student's classroom performance? Does the use of an oral/written language therapy approach improve classroom reading and writing skills? Does the bisensory treatment approach improve classroom performance in other curriculum areas such as social studies and science? Finally, does the difficulty level of the language target have an effect on the need for bisensory learning? Additional research addressing these and other related questions is clearly needed.

Conclusion. The results of this study led to two conclusions. First, although further research is needed, the results suggest that the use of a combined written/oral treatment program may be more effective in developing oral language than an oral-only treatment program. Until such research confirms or clearly discounts the effectiveness of a bisensory treatment approach, professionals may wish to consider more bisensory therapeutic stimulation for their hearing-impaired children. By incorporating a bisensory approach with hearing-impaired children, each child may receive more language input and visual feedback. The additional

input and feedback could significantly enhance the language learning process. Second, the direct treatment of a language delay was shown to be more effective than providing no treatment for delayed language in hearing-impaired children. This finding is significant, especially when considering the importance of accountability and documentation in the aural rehabilitation profession.

References

- Barlow, D., & Hayes, S. (1979). Alternating treatments' design: One strategy for comparing the effects of two treatments in a single subject. Journal of Applied Behavior Analysis, 12, 199-210.
- Bellugi, U., & Klima, E. (1972). The roots of language in the sign talk of the deaf. Psychology Today, 1, 173-200.
- Bloom, L. (1974). Talking, understanding, and thinking. In R. Schiefelbusch & L. Lloyd (Eds.), Language Perspectives-Acquisition, Retardation and Intervention, 285-311, Baltimore, MD: University Park Press.
- Bloom, L. (1980). Language development, language disorders, and learning disabilities: LD³. Bulletin of the Orton Society: An Interdisciplinary Journal of Specific Language Disability, 30, 115-133.
- Bloom, L., & Lahey, M. (1978). Language Development & Language Disorders. New York: Wiley.
- Bunch, G. O. (1979). Degree and manner of acquisition of written English language rules by the deaf. American Annals of the Deaf, 124, 10-15.
- Calvert, D.R. (1982). General American speech and phonic symbols. American Annals of the Deaf, 127, 405-410.
- Carney, A. E. (1986). Understanding speech intelligibility in the hearing-impaired. Topics in Language Disorders, 6, 47-59.
- Charrow, V., & Fletcher, D. (1974). English as the second language of deaf children. Developmental Psychology, 10, 463-470.
- Cole, E. B., & Paterson, M. M. (1986). Assessment & treatment of phonologic disorders in the hearing impaired. In J. Costello & A. Holland (Eds.), Handbook of Speech & Language Disorders (pp. 93-127). San Diego: College Hill Press.

- Collins-Ahlgren, M. (1974). Teaching English as a second language to young deaf children: A case study. Journal of Speech & Hearing Disorders, 39, 486-500.
- Collins-Ahlgren, M. (1975). Language development of two deaf children. American Annals of the Deaf, 120, 524-539.
- Conway, D. (1985). Children (re)creating writing: A preliminary look at the purposes of free-choice writing of hearing-impaired kindergarteners. The Volta Review, 87, 91-107.
- Cooper, R. L. (1967). The ability of deaf and hearing children to apply morphological rules. Journal of Speech & Hearing Research, 10, 77-86.
- Curtiss, S., Prutting, C. A., & Lowell, E. L. (1979). Pragmatic and semantic development in young children with impaired hearing. Journal of Speech & Hearing Research, 22, 534-552.
- deVilliers, J. G., & deVilliers, P. A. (1978). Language Acquisition. Cambridge, MA: Harvard University Press.
- Dodd, B. (1976). The phonological systems of deaf children. Journal of Speech & Hearing Disorders, 41, 185-198.
- Ewoldt, C. (1985). A descriptive study of the developing literacy of young hearing-impaired children. The Volta Review, 87, 109-126.
- Feldman, H. (1975). The development of a lexicon by deaf children of hearing parents or, there's more to language than meets the ear (Doctoral dissertation, University of PA), Dissertation Abstracts International, 36B, 6353.
- Goldin-Meadow, S. (1975). The representation of semantic relations in a manual language created by deaf children of hearing parents: A language you can't dismiss out of hand (Doctoral dissertation, University of PA), Dissertation Abstracts International, 36B, 6353-6354.

- Grewel, F. (1963). Remarks upon the acquisition of language in deaf children. Language and Speech, 6, 37-45.
- Hammermeister, F., & Israelite, N. K. (1983). Reading instruction for the hearing-impaired: An intergrated language arts approach. The Volta Review, 85, 136-148.
- Heider, F., & Heider, G. (1940). A comparison of sentence structure of deaf and hearing children. Psychological Monographs, 52, 42-103.
- Hoffmeister, R., & Wilbur, R. (1980). The acquisition of sign language. In H. Lane & F. Grosjean (Eds.), Recent Perspectives on American Sign Language. 61-78, Hillsdale, NJ: Erlbaum.
- Huttenlocher, J. (1974). The origins of language comprehension. In R. L. Solso (Ed.), Theories in Cognitive Psychology. 331-368, Potomac, MD: Erlbaum.
- Kretschmer, R., & Kretschmer, L. (1978). Language Development and Intervention with the Hearing Impaired. Baltimore: University Park Press.
- Kuhl, P.K. & Meltzoff, A.N. (1982). The bimodal perception of speech in infancy. Science, 218, 1138-1141.
- Litowitz, B. (1981). Developmental issues in written language. Topics in Language Disorders, 1, 73-89.
- Looney, P. A., & Rose, S. (1979). The acquisition of inflectional suffixes by deaf youngsters using written and fingerspelled modes. American Annals of the Deaf, 124, 765-769.
- MacDonald, J.W. & McGurk, H. (1978). Visual influences on speech perception processes. Perception and Psychophysics, 24, 253-257.
- McConkey-Robbins, A. (1986). Facilitating language comprehension in the hearing-impaired child. Topics in Language Disorders, 6, 12-24.

- McGurk, H. & MacDonald, J.W. (1976). Hearing lips and seeing voices. Nature, 264, 746-748.
- McLean, J. E., & Snyder-McLean, L. K. (1978). A Transactional Approach to Early Language Training. Columbus, OH: Merrill Publishing.
- Meadow, K. (1968). Early manual communication in relation to the deaf child's intellectual, social and communicative functioning. American Annals of the Deaf, 113, 29-41.
- Myklebust, H. (1964). The Psychology of Deafness (2nd ed.). New York: Grune & Stratton.
- Norlin, P., & Van Tasell, D. (1980). Linguistic skills of hearing-impaired children. Monographs in Contemporary Audiology, 1, (Dec. 1980, No. 4).
- Oller, D. K., Jensen, H. T., Lafayette, R. H. (1978). The relatedness of phonological processes of a hearing-impaired child. Journal of Communication Disorders, 11, 97-195.
- Quigley, S., & Paul, P. (1984). Language and Deafness. San Diego: College Hill Press.
- Quigley, S., Wilbur, R., Power, D., Montanelli, D., & Steinkamp, M. (1976) Syntactic structures in the language of deaf children. Urbana: University of Illinois, Institute for Child Behavior & Development.
- Raffin, M. (1976). The acquisition of inflectional morphemes by deaf children using Seeing Essential English (Doctoral dissertation, University of Iowa). Dissertation Abstracts International, 37B, 2148.
- Sarachan-Deily, A. B., & Love, R. J. (1974). Underlying grammatical rule structures in the deaf. Journal of Speech & Hearing Research, 17, 689-696.

- Schlesinger, H., & Meadow, K. (1972). Sound & Sign: Childhood Deafness and Mental Health. Berkeley: University of California Press.
- Schriberg, L., & Kwiatkowski, J. (1982). Phonological disorders III: A procedure for assessing severity of involvement. Journal of Speech & Hearing Research, 47, 256-270.
- Simmons, A. (1962). A comparison of the type-token ratio of spoken and written language of deaf children. The Volta Review, 64, 417-421.
- Skarakis, E., & Prutting, C. (1977). Early communication: Semantic function and communicative intentions in the communications of the preschool child with impaired hearing. American Annals of the Deaf, 122, 382-391.
- Starlinger, I., & Niemeyer, W. (1981). Do the blind hear better? Investigations on auditory processing in congenital or early acquired blindness (1. Peripheral functions). Audiology, 20, 503-509.
- Starlinger, I., & Niemeyer, W. (1981). Do the blind hear better? Investigations on auditory processing in congenital or early acquired blindness (2. Central functions). Audiology, 20, 510-515.
- Staton, J. (1985). Using dialogue journals for developing thinking, reading, and writing with hearing-impaired students. The Volta Review, 87, 127-154.
- Steinberg, D. (1982). Overcoming linguistic limitations of hearing-impaired children through teaching written language. Topics in Language Disorders, 2, 17-28.
- Stuckless, E. R., & Birch, J. W. (1966). The influence of early manual communication on the linguistic development of deaf children. American Annals of the Deaf, 111, 452-460, 490-504.
- Vernon, M., & Koh, S. (1970). Early manual communication and deaf children's achievement. American Annals of the Deaf, 115, 527-536.

Wood, B. (1976). Children and Communication: Verbal and Nonverbal Language Development. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Yoshinaga-Itano, C. (1986). Beyond the sentence level: What's in a hearing-impaired child's story? Topics in Language Disorders, 6, 71-83.

Yoshinaga-Itano, C., & Snyder, L. (1985). Form and meaning in the written language of hearing-impaired children. The Volta Review, 87, 75-89.

Appendix A**3RD PERSON SINGULAR****Treatment Targets**

bends
 bounces
 brings
 brushes
 bumps
 buttons
 buys
 chooses
 combs
 cooks
 crashes
 crawls
 cries
 divides
 dreams
 dresses
 drinks
 eats
 empties
 falls
 follows
 gets
 gives
 glues
 goes
 hits
 hurts
 irons
 leaves
 lets
 looks
 mails
 mixes
 opens
 orders
 picks
 pours
 punches
 pushes
 puts
 races
 rakes

reads
 rides
 scratches
 sets
 sews
 shakes
 sharpens
 shines
 shoots
 shops
 sings
 sinks
 sits
 sleeps
 sneezes
 splashes
 stirs
 takes
 ties
 waits
 washes
 waters
 writes

Probes

barks
 burns
 carries
 catches
 climbs
 digs
 drives
 drops
 dumps
 feeds
 fishes
 flies
 hangs
 helps
 holds
 laughs
 licks
 listens
 loses
 makes
 plays
 runs
 saves
 says
 smiles
 sprays
 stands
 stops
 swims
 swings
 talks
 tells
 throws
 watches
 yells

Appendix A (cont.)**POSSESSIVES**Treatment Targets

artist's
 astronaut's
 baby's
 basketball player's
 beach's
 Boy Scout's
 carpenter's
 cave's
 chef's
 chest's
 cook's
 doctor's
 dragon's
 fisherman's
 flower's
 gardener's
 goat's
 Grandma's
 house's
 hospital's
 Indian's
 judge's
 lifeguard's
 lumberjack's
 magician's
 mechanic's
 mermaid's
 money's
 moon's
 mouse's
 nurse's
 ocean's
 owl's
 painter's
 parrot's
 patient's
 pirate's
 plumber's
 prince's
 queen's
 robot's
 sailor's

Santa Claus's
 seal's
 seashell's
 ship's
 skunk's
 spaceship's
 swimmer's
 trainman's
 tree's
 trunk's
 waitress's
 water's

Probes

bear's
 bird's
 boy's
 camel's
 castle's
 city's
 clown's
 dentist's
 duck's
 elf's
 fairy's
 father's
 fireman's
 giant's
 girl's
 goose's
 jack-in-the-box's
 king's
 lady's
 lion's
 mailman's
 man's
 monkey's
 monster's
 people's
 Pete's
 policeman's
 pumpkin's
 tiger's
 town's
 train's
 witch's
 woman's

Appendix B: Schedule of Treatment Sessions with Counterbalancing

Subject A

<u>Session #</u>	<u>Treatment Condition</u>	<u>Target Morpheme</u>
1	Tx 1- Oral prac. only -15 min.	Possessive /s/zʌz/
	Tx 2- Oral/written -15 min.	3rd person /s/zʌz/
2	Tx 2-Oral/written - 15 min.	3rd person /s/zʌz/
	Tx 1-Oral prac. only -15 min.	Possessive /s/zʌz/
Etc.		

Subject B

<u>Session #</u>	<u>Treatment Condition</u>	<u>Target Morpheme</u>
1	Tx 1-Oral prac. only - 15 min.	3rd person /s/zʌz/
	Tx 2-Oral/written - 15 min.	Possessive /s/zʌz/
2	Tx 2-Oral/written -15 min.	Possessive /s/zʌz/
	Tx 1-Oral prac. only -15 min.	3rd person /s/zʌz/
Etc.		

Appendix C: Outline of Specific Treatment Procedures

Treatment I:

- Step 1: Oral/signed instructions given re: language target
- Step 2: Oral/signed models given by speech pathologist (5 sentences)
- Step 3: Oral practice by student (15 sentences)
- Step 4: Oral practice by student (short spontaneous paragraph)

Treatment II:

- Step 1: Oral/signed instructions given re: language target
- Step 2: Oral/signed/written models given by speech pathologist (5 sentences)
- Step 3: Written/oral practice by student (15 sentences)
- Step 4: Written/oral practice by student (short spontaneous paragraph)

Appendix D: Specific Instructions Given in Treatment Step One

Instructions for 3rd person singular: "Today you will practice talking about what one other person does in the present time or right now. This language form is called 3rd person singular. When you are talking about what one other person does, you must put an /s/ sound on the verb in your sentence. Let me give you some examples."

Instructions for possessive morphemes: "Today you will practice talking about who things belong to. When someone owns or has something, they possess it. So, this language form is called a possessive. If you want to show who owns something, you must add an /s/ sound to the person's name. Let me give you some examples."

Appendix EUNIVERSITY OF MONTANA
DEPARTMENT OF COMMUNICATION SCIENCES & DISORDERSSUBJECT CONSENT FORM

Project: A comparison of two language treatments in hearing-impaired children.

Investigator: Julie Brooks, B.A., C.C.C.-Sp.

Co-investigator: Michael K. Wynne, Ph.D.

The purpose of this study is to compare two different language treatments in hearing-impaired children. The results of the study will help speech clinicians plan more effective and efficient treatment procedures when working with hearing-impaired children.

One language treatment will involve oral practice only on a target language structure. A second language treatment will include combined oral and written language practice on a target language structure. The targeted language structures are 3rd person singular (He runs) and the possessive morpheme (John's dog).

The above language treatments involve routine procedures which my child encounters every day in speech/language therapy. There are no risks or discomforts posed to the subjects. In addition, the treatments address goals which were established in my child's individual educational plan (IEP). Both treatments should improve my child's overall language abilities.

The study has been explained to me. I have had a chance to ask questions, and I understand that I can ask questions at any time. I may also withdraw my child from the study at any time if I so desire.

I give my consent for my child to participate in this study.

Parent's Signature

Date