Comparative Analysis of Syntactic Abilities of Hard-of-Hearing and Deaf Children, as Measured by the Screening Portion of the Test of Syntactic Abilities

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COMPARATIVE ANALYSIS OF SYNTACTIC ABILITIES OF HARD-OF-
HEARING AND DEAF CHILDREN, AS MEASURED BY THE SCREENING
PORTION OF THE TEST OF SYNTACTIC ABILITIES.

SENIOR HONORS THESIS
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UTAH STATE UNIVERSITY
DEPARTMENT OF COMMUNICATIVE DISORDERS
Introduction to the Topic

The screening portion of *The Test of Syntactic Abilities* (TSA) was administered to hard-of-hearing and deaf students, ages 10 to 19. The test results of three groups, as defined below, were compared:

<table>
<thead>
<tr>
<th>Hearing Threshold Level in dB re: ANSI 1969 Norm</th>
<th>Descriptive Term</th>
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<tr>
<td>41 to 70 dB HL</td>
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<td>71 to 90 dB HL</td>
<td>Severe</td>
</tr>
<tr>
<td>91 plus dB HL</td>
<td>Profound</td>
</tr>
</tbody>
</table>

Statement of the Problem

According to the authors of the *Test of Syntactic Abilities* (TSA), the most difficult task facing deaf and hard-of-hearing children in our educational system is the acquisition of English. The structure, or syntax, of the English language, is especially challenging for these children. The eventual result is that few deaf and hard-of-hearing students acquire even an adequate knowledge of standard English. This in turn affects all other aspects of education, including the learning of reading, writing and content subjects (Quigley, Steinkamp, Power & Jones, 1978). Most deaf and hard-of-hearing children do not even use English syntax to any great extent until they are five or six years old (McAnally, Rose & Quigley, 1987), beyond the critical period for language acquisition (0-4 years), during which children learn language (spoken or manual) quickly and with relative ease. It is estimated that most 18-year-old deaf students have a mastery over only a few syntactic structures of the English language, and that an estimated 50% are reading at or below a fourth-grade level. Only about 10% of 18-year-old deaf students are reported as having reading skills above the eighth-grade level (McAnally et al., 1987).

The characteristics of one’s use of syntax tend to be indicative of the internalized structure with which one is operating, and is reflected in reading and writing performance (Quigley & Paul, 1984). English proficiency and reading comprehension are distinct but related skills in which the functioning level of one affects the performance on the other (Bochner & Albertini, 1988). The TSA is a written test designed as an aid in determining specifically what aspects of standard English structure a child has or has not mastered and is constructed to also reveal details on the nature of any errors as significant deviant patterns that may be characteristic of known patterns in
the language of deaf children. Information of this nature allows for specific analysis of a child’s strengths and weaknesses in English syntax, from which a program for language development or remediation can be derived.

The TSA was initially standardized on profoundly deaf students, and therefore only provides normative data for the profoundly deaf, but the authors state that it is anticipated that the test will be useful for diagnostic and normative assessment of persons with language problems resulting from other causes and for persons with degrees of hearing abilities differing from profound deafness. In addition, much of the research focuses on the profoundly deaf child, leaving the knowledge base for the child in the moderate and severe ranges somewhat vague. The extent to which the English language of the child whose hearing is classified in the moderate and severe ranges resembles that of the child who is profoundly deaf was under investigation in this study.

The purpose of this study was to compare the standard English syntactic abilities of children with differing degrees of hearing abilities, specifically, moderate to moderately-severe hard-of-hearing and severely to profoundly deaf. By comparing the groups to the information on each syntactic structure provided by the authors of the TSA and other sources, similarities and differences can be described. This will provide a means of looking at performance on specific syntactic structures within and between the groups to establish a basis from which to draw educational implications.

Overview of Background Research

In order to understand clearly what factors contribute to hard-of-hearing and deaf children’s difficulty with English syntax, research on common developmental patterns found in the English of hard-of-hearing and deaf children was reviewed. To examine how English language proficiency may be known, or hypothesized, to differ between the groups defined for this study, the relationship of the degree of hearing to the level of English language achievement was reviewed. In addition, the similarities that this situation, the learning of English by hard-of-hearing and deaf children, may have to bilingualism and English as a second language were reviewed to study the possible implications as to the origins of syntactic difficulty for the deaf and hard-of-hearing student, and possible implications for educational programming.
Known Developmental Patterns of Hard-of-Hearing and Deaf Children’s English Language

Children with normal hearing learn spoken English by hearing the sounds of others’ voices and the sound of their own voices. Because deaf and hard-of-hearing children get little or no auditory feedback, they cannot learn spoken language in the same manner. Furthermore, children acquiring spoken language not only hear the words and learn the vocabulary, they also notice the arrangement, or the syntax (Neisser, 1983). Children with normal hearing also hear prosodic elements (stress, pitch, intonation, and word duration). These features have been shown to be naturally exaggerated by mothers, further drawing the child’s attention to important information about the rhythms and arrangement of the language (McAnally et al., 1987). For deaf and hard-of-hearing children, for whom this characteristic auditory input is absent or reduced, this aspect of spoken English, the syntax, is particularly inaccessible. They cannot hear the rhythms of spoken utterances and usually develop little feeling for English syntax. Deaf children have no difficulty understanding the syntax of American Sign Language (ASL) (Neisser, 1983). They learn sign language without being taught. English, however, must be actively taught. Therefore, the more knowledge we can gain of the deaf and hard-of-hearing child’s development and difficulty with English language learning, the easier this task of teaching English may become.

Because human beings have an innate inclination to communicate, and the language of the majority in our society is inaccessible to deaf children, almost all of them devise gesture systems through which they interact with their environment. Researchers have examined some of these gesture systems in an attempt to identify similarities and differences that they may have to English structure and to the development of English in hearing children, in order to understand how those similarities and differences may later, or simultaneously, affect English language learning. The research has shown some similarity in the gesture usage of young deaf and hard-of-hearing children and normal English language development in the strong emphasis on action strings over attribute strings. These action strings reflect understanding of semantic characteristics known to very young hearing children, that is, causative and affective verbs and recipients. This indicates that the gesture systems of deaf children may tend to be organized with semantic, rather than word order focus as in English, which may affect the learning of spoken English in older deaf children (McAnally et al., 1987).
Quigley and his associates conducted an extensive investigation of the comprehension and production of English syntactic structures by deaf children (McAnally et al., 1987). They devised the following ordering of syntactic structures from those that posed the least difficulty for the subjects to those that proved to be the most difficult:

1. negation
2. conjunction
3. question formation
4. pronominalization
5. verb system
6. complementation
7. relativization
8. disjunction
9. alteration

The screening portion of the TSA tests all of these areas as well as the use of determiners. In addition to providing a raw score for each structure, the TSA is constructed so that the alternatives (distractors) to the grammatically correct choice are typical of either stages of development for that structure or common error patterns for deaf children. By analyzing the errors in this way, the teacher can pinpoint areas of weakness for each structure to target and enhance. Each structure will be discussed with a brief explanation of any stage delineations or the most common errors displayed by deaf and hard-of-hearing students.

Negation. In Standard English, negation involves placing the negative element (*no* or *not*) in the proper position of the verb phrase. It occurs in two environments. The first circumstance occurs when the sentence contains an auxiliary verb or verbs. In this case the negative element is placed after the auxiliary, and in some cases may be contracted.

ex. *The children will not talk in class.*

ex. *The boy can’t have lunch.*

Forms of the verb *be* can also function as auxiliary verbs, in which case the placement is the same, and may or may not be contracted.

ex. *She is not going to the movies.*
The second environment is in sentences that do not contain an auxiliary verb or verbs. In this case, a form of the verb *do* is added and the negative element placed after it.

*ex. He didn't lose his notebook.*

Distractors for this structure are for developmental stages of negation as defined by Bellugi (1967, cited in Quigley et al., 1978). In the first stage the negative element is placed before or after the entire sentence. In the next transition, immediately before correct usage, the child puts the negative element inside the sentence, but usually right after the subject, without *do* support or auxiliary verbs (Quigley et al., 1978).

*ex. Stage I: no catch me, or catch no*

*ex. Stage II: I no play.*

**Conjunction.** Conjunction is one of three similar conjoining processes in English. The other two, disjunction and alteration will therefore be discussed here although they seem to pose increased difficulty for the deaf and hard-of-hearing student, as shown by the ranking above. These are recursive processes, which allow for combining simple sentences into more complex sentences. Conjunction does this through the use of *and*, which is inserted between two sentences. If the sentences do not share common elements, both sentences are retained in their entirety.

*ex. The dog barked. + The cat ran. becomes The dog barked and the cat ran.*

If the sentences to be conjoined contain identical elements, the repetition can be dropped or changed by pronominalization.

*ex. Bill skipped lunch. + Bill was hungry. becomes either Bill skipped lunch and was hungry, or Bill skipped lunch and he was hungry.*

If the sentences to be conjoined contain common elements, either in the subjects, objects, verb phrases, verbs, adverbs, or adjectives, conjunction reduction can occur in that position.

*ex. conjoined subjects: Bill went for a walk. + Mary went for a walk. becomes Bill and Mary went for a walk.*

*ex. conjoined objects: Bill likes baseball and basketball.*

*ex. conjoined verb phrases: Mary likes music and listens to the radio.*

*ex. conjoined verbs: Bill washed and dried the dishes.*
ex. conjoined adverbs: Mary washed her car thoroughly and quickly.

ex. conjoined adjectives: Bill is handsome and tall.

Conjunction of entire sentences generally precedes the use of conjunction reduction. Typical syntactic deviations from Standard English found in the language of deaf and hard-of-hearing students include and deletion, and violation of the structures that can be reduced. Only structures that serve the same function can be candidates for conjunction reduction (Quigley et al., 1978).

ex. and deletion: The boy ran away didn’t come back.

ex. reduction violation: The boy chased the dog. + The dog caught the ball. becomes The boy chased the dog and caught the ball. (The object and subject are not common elements, serving the same purpose. Therefore, reduction in this manner fails to convey the original meaning.)

Disjunction. Performing a similar syntactic function as above, disjunction conjoins with the use of but. These sentences can have subject-subject elements in common, object-object, or object-subject, in which the common element in the second sentence can be pronominalized (Quigley et al., 1978).

ex. subject-subject: The girl fell down but she wasn’t hurt.

ex. object-object: Bill found a penny but Mary kept it.

ex. object-subject: Mary called her mother but she wasn’t home.

Alteration. With the use of or, alteration can include alternate subjects, objects, verb phrases, adjectives, and entire sentences. Also included in alteration is the use of the pairs either-or, and neither-nor.

ex. alternate subjects: Bill or Mary will go.

ex. alternate objects: Mother will give Bill the book or the ball.

ex. alternate verb phrases: Mary either went home or got lost.

ex. alternate adjective: Bill is either happy or sad.

ex. alternate sentences: The dog ran away or the boy lied.

Although disjunction and alteration are similar to conjunction syntactically, they are very different semantically. No systematic deviations from Standard English have been found for these structures. However, the meaning of the sentences is often misinterpreted. For example, when
presented with the sentence *Either Jim or Sally will play with Susan*, the deaf child often interprets that both persons will play with Susan (Quigley et al., 1978).

**Question formation.** In Standard English, the formation of questions falls into two major categories: yes/no questions and wh-questions. Yes/no questions can be formed first by inverting the subject and the auxiliary verb of a sentence. Secondly, when no auxiliary is present, a question can be formed by inserting a form of the verb *do* at the beginning of the sentence and maintaining the main verb in its present tense form. Lastly, a question can be formed by adding a question tag to the end of a declarative sentence, reversing the polarity of the declarative sentence.

ex. subject-aux inversion: *She is going home.* becomes *Is she going home?*

ex. *do* support: *She went home.* becomes *Did she go home?*

ex. tag question: *She is going home, isn’t she?*

Wh-questions take the first two forms as described for yes/no questions, with the addition of a wh-word in the initial position of the sentence.

ex. subject-aux inversion + wh-word *When is she going home?*

ex. *do* support + wh-word *Why did she go home?*

Syntactic deviations commonly used by deaf students that are included as the distractors in the test are labeled as “copying”, “failure to apply subject-auxiliary inversion” and “verb-object inversion” (Quigley et al., 1978).

ex. copying: *The boy chased the dog.* becomes *Who the boy chased the dog?*

ex. failure to invert subject and auxiliary: *Who the boy did chase?*

ex. verb-object inversion: *Who the cake cut?*

**Pronominalization.** Pronominalization is the substitution of an appropriate pronoun for a noun phrase, once that noun phrase has been fully specified, or will be specified shortly. This requires that the speaker match the semantic features with syntactic environments and has four requirements for correct usage. First is the case, or whether the pronoun should be in its subject, object, possessive, possessive adjective or reflexive form. Secondly, the pronoun must agree in number; singular or plural, and thirdly in person; first, second or third. Lastly, the pronoun in the third person singular must agree in gender; masculine, feminine or neuter. Pronominalization is required
in two environments in English: the second occurrence of the noun phrases in a relative clause, and in the reflexive use.

ex. relative clause: *The rat the rat ate the cheese died.* becomes *The rat that ate the cheese died.*

ex. reflexive: *Mary talked about Mary.* becomes *Mary talked about herself.*

The only delineated distractor for this structure is failure to pronominalize, instead providing the noun or noun phrase again (Quigley et al., 1978). Other errors would need to be assessed in relation to individual patterns.

Nominalization. Using nominalization, it is possible to create nouns or noun phrases from other classes of words (usually adjectives and verbs) or from sentences.

ex. adjective to noun: *real* becomes *reality*

ex. verb to noun: *discuss* becomes *discussion*

ex. sentence: *The boy laughed* becomes *The boy's laughing or The laughter of the boy*

Errors in this area are often due to the attaching of the nearest noun phrase-verb phrase-noun phrase to recover the sentence’s meaning (Quigley et al., 1978). For example, the sentence *The laughter of the boy surprised the girl,* would be interpreted to mean that the boy surprised the girl, rather than the laughter. This may be indicative of a surface-reading-order strategy, which will be discussed later.

Verb system. The verb processes of the English language are complex. Theorists have identified two kinds of main verbs, which then can be further divided. The first kind are ordinary verbs, further divided into transitive (requiring an object) and intransitive (not requiring an object). The second kind of main verbs are copulative or linking, which “link” the subject to a modifier in the predicate. In addition to main verbs, auxiliary verbs can be used to indicate tense (past, present or future), aspect (progressive, perfective or progressive/perfective), and voice (passive).

Four deviations from Standard English that are found in the language of deaf students are included as distractors. They are *be-have* confusion, *be* and *have* deletion, verb deletion, and incorrect pairing of auxiliary verbs and verb markers (Quigley et al., 1978).

ex. *be-have* confusion: *Mary has sick.* 

ex. *be* and *have* deletion: *Mary sick.* 

ex. *Bill is a good job.* 

ex. *Bill a good job.*
ex. verb deletion (occurs separately from be/have deletion, because it occurs with verbs of action): *The boy the dog.*

ex. incorrect pairing of auxiliary and verb marker: *Bill was drived the car.*

Other sources also indicate that the passive voice verb construction is particularly difficult for many deaf and hard-of-hearing students, in both reading comprehension and spoken usage of English because of the inherent difficulty of the auxiliary and because it departs from the subject-verb-object order that seems to be the most comfortable construction (McAnally et al., 1987). As a result passive sentences are often interpreted as active ones (Power & Quigley, 1973, cited in McAnally et al., 1987). In a study by McGill-Franzen and Gormley (cited in McAnally et al., 1987) it was found that comprehension of passive constructions by deaf children was better when they occurred in familiar prose than when they occurred in isolation, indicating that the students were able to gain better understanding by drawing from the context of the whole.

**Complementation.** Another recursive process in English, complementation, allows for the embedding of sentences which then function as noun phrases in the subject or object position of the new sentence. There are three distinct classes of complements: *that*-complements, which consist of two simple sentences joined by *that; for-to* complements, which are reductions of complete sentences then embedded into other sentences with the use of *for and to; and POSS-ing* complements, or gerunds, which are also reductions of complete sentences embedded in other sentences, but with the use of the possessive morpheme 's and the *ing* verb ending.

ex. *that*-complement: *Bill knows that Mary went home.*

ex. *for-to* complement: *Bill likes for Mary to stay longer.*

ex. *POSS-ing* complement: *Mary's leaving was unexpected.*

Syntactic deviations from Standard English that are accepted by many deaf students are again included as distractors. Incorrect tense markings may be used with *for-to* complements, as in *Bill likes for Mary to stayed longer.* Another deviation occurs in the inappropriate presence of *to* in *POSS-ing* complements, as in *Bill went to running.* Deletion of *that* in *that*-complements may also occur in identical fashion to *and* deletion discussed earlier (Quigley et al., 1978).

**Relativization.** This is the third recursive process in English. In a relativized structure, one sentence must be embedded within another. The two sentences must contain identical noun
phrases, but can be in either the subject or object position of each, resulting in four possible types: subject-subject, object-object, object-subject, and subject-object. The clauses are also classified by their position within the main sentence, as either medial or final. These two classifications combined result in four basic types of relativized structures: subject-final, subject-medial, object-final, and object-medial.

- ex. subject-final: *I met the woman who bought the house.*
- ex. subject-medial: *The woman who bought the house lives in New York.*
- ex. object-final: *I met the woman whom the children had seen yesterday.*
- ex. object-medial: *The woman whom the children had seen was tall.*

Several common errors are seen in the English language usage of deaf students in the area of relativization, and are included in the TSA as distractors. Relative pronoun deletion is permitted grammatically when the pronoun serves as the object of an embedded sentence, as in *I saw the woman whom the children had seen.* Deaf students have often been found to delete the relative pronoun when it serves as the subject of an embedded sentence, which is not grammatically accurate. Another phenomenon that occurs is relative copying, in which the noun phrase is included after the relative pronoun instead of replacing the noun phrase with the relative pronoun as is correct grammatically. Interestingly, this is also a frequent error made by individuals who are learning English as a second language and by some language delayed children with normal hearing. Finally, adjectives may be placed improperly as a result of misapplication of “whiz deletion”. When whiz deletion occurs, the relative pronoun serving as the subject of the sentence is dropped when it is followed by a form of the verb *be*, which is also then dropped. For example, the sentence *The man who was jumping over the fence fell* is equally grammatical as *The man jumping over the fence fell*. This is the only environment in which the relative pronoun serving as the subject of a sentence can be dropped. However, if an adjective follows the relative pronoun and the *be* verb to be deleted, the result of whiz deletion would be ungrammatical because in English an adjective must be placed immediately prior to the noun it describes (Quigley et al., 1978). For example, in the sentence *The girl who was ill went home*, whiz deletion would result in the ungrammatical sentence *The girl ill went home.*
**Determiners.** The determiner system in English consists of articles, demonstratives and genitives, and has two distinct rules for usage. First, only one determiner may appear in a noun phrase, and secondly, determiners must precede any adjectives associated with a noun phrase. The TSA assesses the use of both definite and indefinite articles, their agreement with number (count and mass nouns), sequencing (a definite article is used in contexts after an indefinite article has been used initially), ordering of determiner-adjective-noun, quantitative uniqueness (unique elements of the environment such as the sun, and not some sun), appropriate environments for omitting the determiner (there are no rules that specify before which nouns the determiner can be dropped) and finally predeterminers (used with the definite article the as in some of the boys, or all of the pieces) (Quigley et al., 1978). Some research indicates the deaf students frequently delete determiners in inappropriate environments (Taylor, 1969, cited in Quigley et al., 1978).

It has also been found that deaf and hard-of-hearing children frequently employ a reading order strategy referred to as a surface-reading-order strategy (Power & Quigley, 1973). A very common example of this is seen in the frequent imposition of a subject-verb-object structure, even when it may be inappropriate. A surface-reading-order strategy appears to be the basis of some types of errors made in verb structures, relativization, complementation and nominalization. They also tend to connect the nearest noun phrase and verb phrase which leads to misinterpretation of many sentences, such as those containing embedded relatives. Taken into account, this may suggest that deaf children may process English as a linear rather than a hierarchal structure, which probably accounts for a large part of their difficulty with the English language (McAnally et al., 1987). Overall, it has been shown that deaf children do acquire rule governed structures, as is seen in the systematic deviances that they often produce, but the rules often differ from Standard English syntactic structure.

**Relationship of the Degree of Hearing Loss to Level of English Language Achievement**

There is considerable contradiction in the literature as to the relationship between the degree of hearing and the level of linguistic achievement. For example, in an early study, Bown and Mecham (1961) attempted to account for verbal deficiency in hard-of-hearing children by comparing performance on the Verbal Language Development Scale with intellectual performance, with chronological age, and with degree of hearing. It was found that the amount of hearing had
the most significant relationship to the Verbal Language Quotients. It was concluded that the less the level of hearing, the greater the probability of English language dysfunction. However, a more recent study by Davis, Elfenbein, Schum, and Bentler (1986) looked at a sample of middle-class children whose only apparent disability was reduced hearing levels to allow for examination of the effects of the level of hearing on several aspects of development. Their data indicated that it is not possible to predict hard-of-hearing children’s language or educational performance on the basis of degree of hearing alone. Therefore, the assumption that the lower the level of hearing, the more severe the language and educational deficits, was not supported. In addition, several investigators have reported finding similar delays in English language learning and academic achievement by children in the mild, moderate and severe ranges. The discrepancy in this data precipitates the need for studies of this nature, in order to more specifically pinpoint the areas of syntactic breakdown within each group and between groups. This will help to further describe the relationship between the degree of one’s hearing ability and the subsequent level of English language proficiency.

Correlation to Bilingualism and English as a Second Language

In recent years, investigators have proposed that English be considered a second language for deaf children. It has been proposed that the techniques and research in bilingualism and second-language learning be researched for possible means of providing improved language and educational development for deaf and hard-of-hearing children (Quigley & Paul, 1984).

Not all deaf children in the United States are exposed to English as a first language, and for those who are, it is pointed out that oral English presents the deaf or hard-of-hearing child with only a partial representation of the language, as only about 50% of speech sounds are visible at the lips (Jeffers & Barley, 1971, cited in Quigley & Paul, 1984) and prosodic features are not available for the child. The majority of deaf children in the United States have hearing parents whose primary language is standard English. This presents a linguistic problem for the deaf or hard-of-hearing child in this situation, as they often have no initial language base for English as they enter school. This makes the choice of an appropriate educational approach a complicated one.

Manually-coded English systems have been developed on the grounds that they provide visually fluent forms of English language input and that they conform to the syntactic structure of English. In a study conducted by Schafer and Lynch (1980, cited in McAnally et al., 1987), of a sample of
deaf children of hearing parents, it was found that the children did not begin to combine words or signs until approximately 26 months or older. Other studies have looked at deaf children of deaf parents, or deaf children whose hearing parents learned some form of manual communication early and used it consistently. The studies show that these children begin combining words or signs at 17 or 18 months (McAnally et al., 1987). This finding has been supported by other research that reveals deaf children showing satisfactory English language development when consistent use of manual communication was employed at an early age.

American Sign Language (ASL) also may provide the advantages of manually-coded English in its intelligibility, fluency and ease of motor production, but differs significantly because it is a language in its own right, with its own syntactic structure which differs from standard English syntax. In presenting ASL as an initial language to deaf and hard-of-hearing children, a true bilingual situation exists, whereas manually-coded English systems are attempts to establish English, in other forms, as the first language of deaf children (Quigley & Paul, 1984). If deaf and hard-of-hearing children do come to school knowing a language, it is most likely to be ASL. This has led to the position that ASL should be the first language of deaf students because it can be learned in a natural, interactive manner. It is thought that this would create a more homogeneous group of students as they enter school, who all have a well-developed linguistic background, making it easier, theoretically, to acquire English as their second language (Paul & Quigley, 1987).

Although, there is controversy as to which sign system should be employed, it is generally thought that any system that will establish an initial language base for the deaf and hard-of-hearing child will potentially be advantageous to further language learning, in most cases, specifically to the acquisition of oral English.

Purpose and Objectives

The purpose of this study was to compare the Standard English syntactic abilities of children with differing degrees of hearing abilities. The primary objective was to procure data which might be utilized to describe similarities and differences between the performance of the groups (moderate to moderately-severe, severe, and profound) with respect to the overall test and the individual structures tested, in order to establish a basis from which to draw educational implications.
Population and Sample

The sample for this study was drawn from students at the Idaho School for the Deaf and Blind (ISDB) in Gooding, Idaho. All students in the sixth through twelfth grades were tested. Criteria for inclusion in the research sample were unaided hearing thresholds greater than 41 dBHL, and no other educationally significant handicaps. Age of onset of hearing loss, when it was known, generally ranged from birth to one year, with one subject at two years and one at six years. Etiology of hearing losses, when known, included heredity, trauma at birth, prematurity, Rh incompatibility, otitis media, meningitis, rubella, measles, biotin deficiency, and high fever.

Design

The majority of the tests were administered by the researcher on February 16 and 17, 1993, during regularly scheduled English classes at ISDB. The tests not given on these days, due to student absence and scheduling conflicts, were administered throughout the following two weeks by ISDB faculty. Introduction to the test and instructions were provided in signed English and spoken English. Background information for each student, regarding etiology and age of onset of hearing loss, better ear pure tone average (PTA) for 500, 1000 and 2000 Hz, and presence of any other educationally significant handicap, was gathered by the researcher from school records. All tests were scored by the researcher and sent to ISDB for their permanent records.

Instrumentation and Data

The subjects were grouped according to the degree of hearing and the data compared with respect to overall performance and most frequent errors. A change from the groups originally proposed was made due to the number of students in each group. Considerably more students at the Idaho School for the Deaf and Blind were classified in the severe and profound groups than in the moderate groups. The groups for comparison were therefore defined as follows:

<table>
<thead>
<tr>
<th>Hearing Threshold Level in dB re: ANSI 1969 Norm</th>
<th>Descriptive Term</th>
<th># of Subjects</th>
<th>Age Range</th>
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<td>41 to 70 dB HL</td>
<td>Moderate to Moderately-Severe (M/MS)</td>
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<td>71 to 90 dB HL</td>
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<td>91 plus dB HL</td>
<td>Profound (P)</td>
<td>31</td>
<td>12-19</td>
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The TSA Screening test contains 120 multiple choice questions. Each test was scored and a total raw score (number correct out of 120) found. Table 1 shows the distribution of total raw scores for each group.

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<td>96</td>
</tr>
<tr>
<td>119</td>
<td>98</td>
<td>113</td>
</tr>
</tbody>
</table>

Table 1. Total Raw Scores for Each Group

In order to determine whether the variance between the groups was significant, an Analysis of Variance (ANOVA) test was performed on the data. The ANOVA Summary Table is shown in Table 2. Mathematical computations resulting in this summary table are detailed in the Appendix. This analysis reveals that there was not a significant difference between groups because the computed value for F does not equal or exceed the critical value.
## ANOVA SUMMARY TABLE

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>896.015</td>
<td>2</td>
<td>448.0075</td>
<td>1.34</td>
</tr>
<tr>
<td>Within groups</td>
<td>17,350.094</td>
<td>52</td>
<td>333.65565</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>18,246.109</td>
<td>54</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Critical Value for F (5%) = 3.23

Table 2. ANOVA Summary Table

Errors for each structure were converted to percentages, as there were variable numbers of questions pertaining to each structure. Table 3 shows what percentage of each group scored within the ranges of 100% correct, 90 to 99% correct, 80 to 89% correct, 70 to 79% correct, 60 to 69% correct and below 59% correct for each syntactic structure.

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th>M/MS % of total</th>
<th>S % of total</th>
<th>P % of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100% correct</td>
<td>63.64</td>
<td>76.92</td>
<td>70.97</td>
</tr>
<tr>
<td>90-99% correct</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80-89% correct</td>
<td>18.18</td>
<td>23.08</td>
<td>16.13</td>
</tr>
<tr>
<td>70-79% correct</td>
<td>18.18</td>
<td></td>
<td>6.45</td>
</tr>
<tr>
<td>60-69% correct</td>
<td></td>
<td></td>
<td>6.45</td>
</tr>
<tr>
<td>&lt; 59% correct</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conjunction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100% correct</td>
<td>9.09</td>
<td>69.23</td>
<td>29.03</td>
</tr>
<tr>
<td>90-99% correct</td>
<td>36.36</td>
<td>7.69</td>
<td>25.81</td>
</tr>
<tr>
<td>80-89% correct</td>
<td>27.27</td>
<td></td>
<td>16.13</td>
</tr>
<tr>
<td>70-79% correct</td>
<td>9.09</td>
<td></td>
<td>12.90</td>
</tr>
<tr>
<td>60-69% correct</td>
<td></td>
<td>7.69</td>
<td>6.45</td>
</tr>
<tr>
<td>&lt; 59% correct</td>
<td>18.18</td>
<td>15.38</td>
<td>9.68</td>
</tr>
<tr>
<td>Determiners</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100% correct</td>
<td>63.64</td>
<td>53.85</td>
<td>25.81</td>
</tr>
<tr>
<td>90-99% correct</td>
<td>9.09</td>
<td>30.77</td>
<td>19.35</td>
</tr>
<tr>
<td>80-89% correct</td>
<td>9.09</td>
<td>15.38</td>
<td>25.81</td>
</tr>
<tr>
<td>70-79% correct</td>
<td>18.18</td>
<td></td>
<td>9.68</td>
</tr>
<tr>
<td>60-69% correct</td>
<td></td>
<td></td>
<td>3.23</td>
</tr>
<tr>
<td>&lt; 59% correct</td>
<td></td>
<td></td>
<td>16.13</td>
</tr>
</tbody>
</table>
Table 3. Percentage of Each Group Scoring in Specific Ranges for Each Syntactic Structure

As was seen in the overall scores, no consistent pattern exists in the errors made on the individual structures that delineates one group from another. On some structures (determiners, question formation, and verb processes) the percentage of those in each group getting all items
correct decreases with lower levels of hearing (from M/MS to P), but this is not systematic throughout the ranges and other structures. The scores of the profoundly deaf group do show a wider range of scores, but this may be due to the larger number of subjects in that group.

The most frequently missed structures were relativization and complementation, with 87% of the students missing some portion of the items on each of those sections. For relativization, all of the students in the moderate to moderately-severe group made an error on at least one, with approximately 79% of the students scoring below 79%. In the severe group, approximately 54% of the students scored 79% or less and likewise, in the profound group, approximately 58% scored less than 79%. Complementation items were also missed by 87% of the students, but not as many items were missed overall. Only 18% of the students in the moderate to moderately-severe group scored below 79%, 31% in the severe group, and 42% in the profound group.

Nominalization items were missed by 82% of the students, followed by pronominalization, in which an item or items were missed by 71% of the students. Sixty-seven percent made errors in verb processes and 65% in conjunction. Below is the ordering of the structures from least to most difficult as shown by the data for this sample. Included for comparison is Quigley’s ordering in the TSA manual (Quigley et al., 1978).

<table>
<thead>
<tr>
<th>ISDB</th>
<th>TSA NORMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Negation</td>
<td>1. Negation</td>
</tr>
<tr>
<td>2. Question formation</td>
<td>2. Conjunction</td>
</tr>
<tr>
<td>3. Determiners</td>
<td>3. Determiners</td>
</tr>
<tr>
<td>4. Conjunction</td>
<td>4. Question formation</td>
</tr>
<tr>
<td>5. Verb processes</td>
<td>5. Verb processes</td>
</tr>
<tr>
<td>6. Pronominalization</td>
<td>6. Pronominalization</td>
</tr>
<tr>
<td>7. Nominalization</td>
<td>7. Relativization</td>
</tr>
<tr>
<td>8. Relativization / Complementation</td>
<td>8. Complementation</td>
</tr>
<tr>
<td></td>
<td>9. Nominalization</td>
</tr>
</tbody>
</table>
Discussion

The purpose of this study was to compare the Standard English syntactic abilities of children with differing degrees of hearing abilities in order to describe similarities and differences between the performance of each group with respect to the overall test and the individual structures tested. Because the acquisition of English, especially the structure, or syntax, is perhaps the most difficult task facing deaf and hard-of-hearing children in our educational system, it is essential that we develop a better understanding of the ways in which different degrees of hearing may affect English language learning, and how students with differing degrees of hearing abilities may be expected to vary in this area of learning. The first step in further developing this understanding is continued, comprehensive research.

The results of this study should be used with caution as to the extent to which they are representative of the larger population of hard-of-hearing and deaf students. The sample size was relatively small and extracted from one population, a residential school for the deaf and blind. In addition, factors other than degree of hearing and age which contribute to one’s educational background and English language proficiency were not controlled for.

In this study, it was found that the test scores of the groups, moderate to moderately severe, severe, and profound did not differ significantly. Thus, the common assumption that the less the level of hearing, the more severe the language deficits (Bown & Mecham, 1961), was not supported. Rather, the data suggest that it is not possible to predict English language abilities on the basis of hearing loss alone. This finding is not new, but is a duplication of findings in similar studies (Davis, Elfenbein, Schum, & Bentler, 1986). Many recent studies have shown similar English language functioning and educational achievement by students with differing degrees of hearing. These findings have serious implications for educational placement and qualification for special services. Children must not be categorized and placed in a learning environment according to a strict set of predetermined guidelines. Each child’s areas of strength and weakness should be considered as well as other factors which may contribute to his or her functioning. Other factors to be considered may include age of onset of the hearing loss, socioeconomic status, level of parental education and involvement, intelligence, psychological status, and personality.
Within the most frequently missed structures, errors that were made often typified a surface-reading-order strategy, in which the closest noun and verb were chosen to relate to each other, thus leading to misinterpretation of meaning. This surface-reading-order strategy appeared to be a contributing factor in many of the errors made on the relativization and complementation items, and for some of the errors students made on the nominalization items.

Relative copying was a common error on relativization items, as was improper placement of adjectives within relativized sentences. Relative copying is also a frequent error made by individuals who are learning English as a second language. Thus again, the issue of how the situation in educating deaf and hard-of-hearing children in Standard English may be correlated with bilingualism and teaching English as a second language is raised.

In addition to surface-reading-order, accurate performance on complementation items was greatly reduced by the choice of the distractors containing the inappropriate presence of *to* in *POSS-ing* complements. The most frequently occurring error for the pronominalization items was failure to pronominalize. In these errors, the noun or noun phrase was provided again rather than being replaced with a pronoun, an alternative that is semantically but not syntactically correct.

Because of the nature of the embedding present in relativization and complementation, misinterpretation of agent and action were common. Nominalization and some verb structures “upset” the comfortable subject-verb-object structure so that when a surface-reading-order strategy was employed, meaning was again misaligned.

**Implications for Educational Programming**

The results of this study provide implications for educational programming. Based on the current level of English functioning in deaf and hard-of-hearing students, it is apparent that the majority of the approaches being used are not successful. Deficiencies displayed directly tie into the syntactic aspects of English language learning. Increased knowledge of hard-of-hearing and deaf students’ difficulties with specific areas of English syntactic development may provide a base from which to construct programs which will provide the deaf and hard-of-hearing student greater access to the English language.

Because individual scores are available, each English teacher may want to compile the number and types of errors for the structures most commonly seen in the performance of the students in
each class, in order to identify primary areas that need attention for those selected students. By looking at the nature of the errors made for individual students, a more specific program might be outlined for teaching the structures that were apparently more difficult.

Overall, it appears that those structures which have the greatest impact on successful communication using English, both expressively and receptively, should be targeted first. According to the produced ordering of the structures, the majority of those which have significant impact on general sentence meaning, also are the more difficult structures, these being relativization and complementation, nominalization, and verb processes. Correct use of negation also has major impact on accurate interpretation, because the polarity of an utterance depends upon its presence or absence. However, negation proved to pose the least difficulty for these students.

Conclusion

The most salient conclusion that can be drawn from this study and supported by others of its kind (Davis et al., 1986) is that students cannot be categorized and placed in a learning environment according to a strict set of predetermined guidelines, especially those that consider level of hearing alone. Each child’s areas of strength and weakness should be considered as well as other factors which may contribute to his or her educational functioning, such as level of parental education and involvement, intelligence, psychological status, and personality. In addition, the research that relates English language learning in deaf and hard-of-hearing children to characteristics of English as a second language and which suggests the possibility of bilingual programming should be further explored as a possible guide to educational programming.
Bibliography


APPENDIX
ANOVA COMPUTATIONS

Σ M/MS = 1,137
Σ M/MS² = 119,621

Σ S = 1,352
Σ S² = 143,456
Σ P = 2,963
Σ P² = 295,611
Σ Tot = 5,452
Σ Tot² = 558,688

\[ S_{\text{tot}} = \frac{\Sigma \text{Tot}² - \left( \Sigma \text{Tot} \right)²}{\text{Tot N}} = \frac{558,688 - (5,452)^2}{55} = 18,246.109 \]

\[ S_{\text{bet}} = \sum \frac{\left( \Sigma \frac{M/MS}{MS} \right)² + \left( \Sigma S \right)² + \left( \Sigma P \right)²}{\text{M/MS N}} - \left( \Sigma \text{Tot} \right)² \]

\[ = \sum \frac{(1,137)^2 + (1,352)^2 + (2,963)^2 - (5,542)^2}{11} = 896.015 \]

\[ S_{\text{wit}} = \sum \frac{\Sigma \frac{M/MS}{MS}² - \left( \Sigma \frac{M/MS}{MS} \right)² + \Sigma S² - \left( \Sigma S \right)² + \Sigma P² - \left( \Sigma P \right)²}{\text{M/MS N}} = \frac{119,621 - (1,137)^2 + 143,456 - (1,352)^2 + 295,611 - (2,963)^2}{31} = 17,350.094 \]

\[ \text{df}_{\text{bet}} = K - 1 = 3 - 1 = 2 \quad \text{df}_{\text{wit}} = \text{Tot N} - K = 55 - 3 = 52 \quad \text{df}_{\text{tot}} = \text{Tot N} - 1 = 54 \]

\[ \text{MS}_{\text{bet}} = \frac{S_{\text{bet}}}{\text{df}_{\text{bet}}} = \frac{896.015}{2} = 448.0075 \quad \text{MS}_{\text{wit}} = \frac{S_{\text{wit}}}{\text{df}_{\text{wit}}} = \frac{17,350.094}{52} = 333.65565 \]

\[ F_{\text{comp}} = \frac{\text{MS}_{\text{bet}}}{\text{MS}_{\text{wit}}} = \frac{448.0075}{333.65565} = 1.34 \]