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THE USE OF THE TEST OF SOCIAL INference
WITH DEAF ADOLESCENTS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
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The Ohio State University
1975

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FACULTY for EXCEPTIONAL CHILDREN
ACKNOWLEDGEMENTS

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CHAPTER I

INTRODUCTION

Background

Social acceptability demands that an individual successfully adapt to the behavioral norms of his milieu. In the majority of social situations encountered, daily rules for socially appropriate behavior are generally implicit and, therefore, must be acquired through experience. Cognitive and language processes have been shown to play an important role in the reception, interpretation and storage of social experiences. The social acquisition process in the prelingually hearing impaired individual, however, is significantly altered. Pre-lingual auditory impairment inhibits an individual's access to implicit and explicit information. The hearing impaired child is thus deprived of these naturally occurring interactions.

Consequently, research has demonstrated that deaf persons are lacking in social maturity when compared with hearing individuals. Yet, the lack of detailed information makes it difficult to assess the particular nature of the deficit in the deaf child's social adjustment. Thus, one of the major difficulties faced by educators and others who work with a deaf population is the dearth of methodology and instrumentation for identifying key areas of social competence.
In attempting to assess various personal and social characteristics of deaf persons, test standards and norms for hearing persons have traditionally been applied to the deaf population. While deaf and hearing persons may share a common community, live under the same social norms and may be members of the same family unit, the acculturation of deaf persons is markedly different. The deaf individual is penalized when assessment standards of the hearing population are applied. Thus, the goal of this investigation was to adapt instrumentation used in the assessment of social inference skills with the mentally retarded population for use with deaf adolescent individuals.

**Problem Statement**

The problem addressed in this research was to investigate the use of instrumentation with deaf adolescents which has proven reliable and valid in the assessment of social inference skills with the mentally retarded population. Educators and vocational counselors could greatly benefit in the planning of intervention programs for the development of appropriate social behavior from an instrument which can validly and reliably assess social inference skills.

**Scope of Research**

This study investigated the feasibility, reliability and validity of employing the *Test of Social Inference* [Edmonson, de Jung, Leland and Leach, 1974] with deaf adolescents attending residential and non-residential educational programs for the deaf. Characteristics of age, sex, type of school attended, hearing threshold and intelligence
Objectives and Questions of Study

Objectives

The objectives of this study were:

1. To adapt the Test of Social Inference for use with deaf adolescents attending either residential or non-residential educational programs for the hearing impaired.

2. To examine an aspect of validity of the Test of Social Inference adapted for use with deaf students through a comparison with ratings by teachers of the pupils' social behavioral adequacy and ratings of student appearance, industry, calmness and academic skill.

3. To determine whether deaf males and females differ with respect to social inference scores.

4. To determine whether there is a difference between social inference scores obtained by residential and non-residential deaf students as measured by the Test of Social Inference.

5. To determine whether age, hearing threshold or intelligence quotients of deaf students affect social inference scores of deaf students as measured by the Test of Social Inference.

Questions

As a result of this study, the following questions were addressed:

1. Can the Test of Social Inference be adapted for use with deaf adolescents?
   (a) What adaptations need to be made in the administration of the test?
(b) What adaptations need to be made in the scoring procedures?

2. Is the adapted Test of Social Inference for deaf adolescents a reliable measure of social inference skills as determined by inter-item correlations?

3. Is the adapted Test of Social Inference for deaf adolescents a valid measure of social inference skills when compared with teacher ratings of deaf students social behavior adequacy and other aspects of student behavior?

(a) Is there a difference between social inference scores of deaf males and females as determined by the Test of Social Inference?

(b) Is there a difference between social inference scores of residential and non-residential deaf students as determined by the Test of Social Inference?

(c) Is there a difference between social inference scores of groups of deaf students with varying hearing loss, I.Q. scores and type of school attended as determined by the Test of Social Inference?

Operational Definitions of Terms

Deafness refers to a loss of auditory acuity which is measured in relative units of sound intensity called decibels (dB). For the purpose of this study, deafness will be defined as an average loss of 60 dB (ANSI, 1969) or greater in the better ear (aided or unaided) across frequencies of the speech range (250 to 4000 cps.).

Residential students refers to those students who lived at school separate from their families during the school week. Non-residential students are those students who reside with their families
on a daily basis and leave home to attend school.

Social inference refers to the interpretation of cues present in the environment that indicate "purpose, attitude, relationships, roles and, thus, the probabilities of action within a situation" [Edmonson, et al., 1974, p. 1].

Test validity refers to an instrument's ability to measure those characteristics which it purports to measure. Concurrent validity is expressed as a validity coefficient obtained from the relationship of test results and measurement of the characteristics in question through other means of assessment.
CHAPTER II

REVIEW OF RELEVANT LITERATURE

Social Perception and Inference

The study of perception spans the psychophysical realm of sensory processes at one end of the continuum to the study of processes of social perception on the other. The latter end of the continuum is the primary focus for this review, however, principles of perception are relevant to the nature of social perception. The notion of perception has traditionally focused on the processing of information through the sensory mechanisms [Rock, 1975, p. 6] which, in turn, relates these signals to the brain. Warr and Knapper [1968, p. 2] define the process of perception as "interactions or transactions between an individual and his environment." Cantril [1968, pp. 4-5] elaborates on the process of perception by emphasizing the complexities involved. He points out that perception results from an individual's awareness of an object or event selected from a conglomerate of factors and is dependent upon past and present experiences. According to Bruner [1958, p. 690], the nature of perception involves categorization of received stimuli to a class of events or objects. What is perceived acquires meaning from the category to which it is assigned.
Recent research in the field of perception has led the scientist to apply principles of perception to the study of man's behavior in social situations. This relatively new area of pursuit has been assigned a variety of names: person perception, social cognition, interpersonal perception and social perception. While object and event perception and social perception are closely related, the latter is influenced by the social nature of the objects perceived [Warr and Knapper, 1968, p. 2], that is, social perception "involves other people whose purpose has a potential influence on our purpose" [Cantril, 1968, p. 8]. Brunswick [1956] makes the distinction between perception and social perception by characterizing object perception as stimuli acting directly upon the sense organs, whereas in social perception, an individual is required to draw conclusions based upon overt and covert information, i.e., needs, values, personality characteristics.

This hypothesis that social perception involves not only sensory stimulation but, in addition, assignment of personal priorities to what is being perceived is supported by the work of several investigators [Osgood, 1953, Estvan, 1958, Suchman and Ascher, 1961]. Thus, social perception is often times the obscure process through which an individual associates and infers stimulus information based upon the subjective as well as objective states of the perceiver [Livesley and Bromley, 1973, p. 5].

Social inference is derived from the processes of social perception. An individual first selects overt and covert information about another person from an array of stimuli and proceeds to
categorize these characteristics [Bruner, 1958, p. 695]. Thus, inferences are initially made on the information received. The elements received have commonalities with the set of elements in which it is categorized [Livesley and Bromley, 1973, p. 16].

Social inference ranges from the processes of categorizing what is perceived through those generalizations formed by attributing characteristics or deriving expectations about the stimulus person, based on past experience [Hilgard, 1962, p. 553; Livesley and Bromley, 1973, p. 17]. For example, the perceiver may observe two people communicating in sign language and thus categorize them as being deaf. From the perceiver's past experience he may infer characteristics of muteness which may infer low intelligence. The perceiver, therefore, infers particular qualities about the perceived persons that are not observable.

Social inferences are likely to be affected by:

1. The observable characteristics of the perceived person and environment.
2. The nature and temporal sequence to which the perceiver responds.
3. The perceivers moods, attitudes, expectations.
4. The perceiver's past experience with the stimuli [Livesley and Bromley, 1973, pp. 17-18].

Therefore, the scope of this literature review focuses upon those events affecting the development of social inference skills. The characteristics of socialization, language development and cognition of the deaf child as well as the hearing child have been
reviewed with relevance to social inference.

**Socialization of Hearing Children**

Review of the socialization process provides information regarding an individual's experience with those in his ever expanding environment. Socialization is clearly a complex process involving dynamic interactions between a child, his family, his immediate environment and his culture. Socialization begins early in a child's life. Primary drives for food, warmth and comfort elicit dependency interactions between the infant and his caretakers [Danzinger, 1971, pp. 104-105]. The maturing child learns through these interactions with others in his environment when dependency is appropriate and when he must rely on his own resources. This type of selective dependency-independence continues from birth through adult life [Thompson, 1962, pp. 470-474].

Within the first year of life a child is capable of responding in a selective manner to social stimuli in his immediate environment. Self-initiated social behavior occurs through acts of smiling, vocalizing, looking at and crying. Equipped with adequate receptive and expressive mechanisms and stimulants in the environment, he becomes capable of increasing the amount of stimulation he receives [Rheingold, 1966].

The critical value of these early interactions to the socialization process has been demonstrated in several studies. Rheingold [1966] cared for eight, six-month old institutionalized infants on a daily basis for eight weeks. During this same period,
eight control infants were cared for in the customary manner by a variety of volunteers and institution personnel. At the end of the eight-week experimental period, results of a social responsiveness test with the infants showed the "investigator's babies" to be more socially responsive to familiar and unfamiliar persons than were the control infants. This study provides insight into the role of caretaker in the socialization process and the infant's abilities to expand his interactive nature to others in his environment.

The long term effect of early social interaction was investigated by Goldfarb (See Mussen, Conger, Kagan, 1963, pp. 168-170). Children raised in foster homes were paired and contrasted with institutionally reared children. Those children placed in foster homes were less aggressive and less dependent than institutionalized children. Foster home children were intellectually and emotionally more responsive, although this group of children did exhibit a developmental lag compared to children reared in a natural interactive-family environment.

As time passes, the number and scope of social interactions of the child increase from child-family to relative, neighbor, and community environments. While an infant does not reject the company of another infant, he does not cooperate in any forms of exchange with the peer, as demonstrated at an experimental baby party [Maudry and Nekula, 1939]. Two-year olds showed definite signs of awareness and momentary cooperation, but essentially participated in solitary play, often engaging in similar types of behavior as their peers. As the child's social behavior undergoes expansion and
reorganization, he engages in an increased amount of interactive experiences. Torrance [1969] investigated the cooperative behavior of a group of five-year olds assigned to a target game task. Those children working in pairs were more willing to attempt the task and more cooperative than those children who were assigned the task alone.

This phenomenal growth in interactive behavior is accounted for by Thompson [1962]:

Human maturation sets the stage for the socialization process and shifts the scenery, while learning determines the dramatic action...Maturational factors make the infant dependent on the mother...for the satisfaction of his physical needs...By the learning principles of generalization and secondary reinforcement these social interactions may become needs in their own right [p. 461].

As the child moves out of the family circle he is confronted with new and unique stimuli. His egocentric nature begins to undergo reconstruction as he moves from parallel play to more associative roles and, finally, to cooperative activities [Parten, 1933]. In addition, the child's independence within his family increases and dependence on peers and the educational environment increases [Thompson, 1962, p. 173].

Summary

The infant is equipped with a set of needs, a disposition for change and a receptive network of biological mechanisms. Society, on the other hand, holds a set of expectations for the infant, demands change and presents the growing child with an array of social stimuli. Much of what the child learns will be acquired implicitly
in interactions with others.

Early socialization is a progressive and dynamic process in which the child's behavior undergoes expansion and, more significantly, reorganization. The family is the first and primary socializing agent, expanding as the child's environment expands to peers and community. Studies reviewed emphasize the importance of learning through early interaction with others. The socialization process is a tremendously complex task in which the family, influenced by society and the child's temperament, play important roles. Thus, through socialization the child learns the relationships between objects, events and persons with whom he comes into contact.

Language Development of Hearing Children

The study of linguistic development has followed much the same pattern as other subjects that will be summarized in this review. Researchers have typically focused on the relative contribution of environmental, maturational and learned factors.

A child acquires the language of his culture, at least partially, through conditioning and associative learning [Jenkins, 1969, pp. 662-664]. Initially, all infants vocalize in virtually the same manner, making noises at random. Sounds produced that are like those in his environment are rewarded and reinforced explicitly by persons attending to him [Jenkins, 1969, p. 662]. At approximately nine months of age, the child produces units of sound which closely resemble duration and intonation patterns of adult speech in his
environment [Nakazinra, 1962].

Meaningful words or utterances are used at approximately ten months of age and combinations of words at eighteen to twenty-four months [McNeill, 1970, p. 1062; Menyuk, 1971, p. 4]. Acquisition of words and their meanings also occur as a result of classical and instrumental conditioning [Allport, 1924; Staats, 1975, p. 124]. The child interacts with objects and events in the environment which serves as unconditioned stimuli. Individuals in his environment provide conditioned stimuli by naming objects or events. Through imitation-reproduction of conditioned stimuli—the child vocalizes a response similar to that of the model [Miller and Dollard, 1941, pp. 275-277]—accurate labeling of the object or event occurs through simple associative and discriminative learning.

Between the ages of three to five years, the child's combination of word strings expands in an orderly manner, becoming more complex. At the end of this period, syntactical structure, that is, the manner in which words are ordered to produce meaningful phrases, is nearly complete. However, acquisition of syntactical structure is not as clearly understood as earlier stages of language acquisition. Brown and Bellugi [1964] have analyzed spontaneous language usage in a longitudinal study of two children. The investigators concluded that these children generalized "rules" of language to strings of words never encountered before. The children perceived models in a system different from that provided by the adult.
Lenneberg [1967] demonstrated that children develop language in cumulative developmental stages. He hypothesized that linguistic performance is based on a fixed-age related schedule [Menyuk, 1971, p. 6]. Environmental influences have also been reported to alter the acquisition and development of language [Bernstein, 1961; Irwin, 1960; Hess and Shipman, 1965].

Summary

A review of the literature suggests that the process of language development occurs in an incredibly short period of time in an extremely complex manner not as yet fully understood. Researchers generally agree that, initially, language is acquired through the auditory and oral systems. Although a majority of the research has focused on verbal production, in addition, observational studies have shown that language learning is affected by environmental and maturational factors.

Language and Cognitive Development of Hearing Children

The works of the Genevan Program, headed by Piaget, represent the most comprehensive theory and research in the field of cognition. Piaget [1968, pp. 8-70] views the developing human organism as proceeding through stages of biological and physiological development, expanding both quantitatively and qualitatively. These stages are sequential and cumulative affected by maturation and interactions between environment and human organism [Elkind, 1970].
The first stage of cognitive development occurs during the first two years of life, where the infant moves from a receptive non-social organism to an interactive and autonomous individual. During this period, the infant accomplishes three major tasks:

1. Information received through sensory mechanisms are integrated and become sources of knowledge.

2. The infant develops the concept of object permanence. That is, objects exist in the environment beyond the infant's perception of the object.

3. The infant's behavior becomes goal directed. He is capable of sequencing two or three actions toward his objective [Baldwin, 1967, pp. 190-193].

Piaget [1963, pp. 21-42] has documented the occurrence of these behavioral changes in several case studies of his own and others' children.

The second, or pre-operational, stage extends from two years to seven years of age. It is during this period that language becomes an integral part of social behavior. The child's language and play schemes are dominated by egocentrism. He is caught within his own point of view, unable to understand issues, commands or questions posed by others. Socialization, at this stage, needs no validation, that is, the child does not doubt his conceptions of the world.

The concrete operational period (seven to twelve years of age) is that time during which the child moves from egocentrism to the expansion of his views and concepts. He becomes aware that others can come to conclusions not in accord with his own, so that interactions now assume a responsiveness to social pressures. Language
competencies become vital to these interactions and to the need for validation of his thoughts.

Surely it must be the shock of our thoughts coming into contact with that of others, which produces doubt and the desire to prove...The social need to share the thoughts of others and to communicate our own with success is at the root of our need for verification [Piaget, 1928, p. 204].

One of Piaget's best known studies [See Flavell, 1970, p. 1026] demonstrated the child's development from egocentrism to the awareness of others' views. The child was seated in front of a model of three mountains and was asked to choose a photograph that represented a view from a given position different from his own. The younger children selected photos representing their own views, while older children tended to choose photos representing views other than their own.

The fourth and final stage is the period of formal operations occurring early in adolescence and continuing through adulthood. Logical thought and complex reasoning is achieved during this period. The child no longer depends upon concrete objects and manipulations to develop causal relationships, but is capable of performing a variety of operations mentally [Elkind, 1970; Baldwin, 1967, pp. 273-288].

Several studies of cognitive development of the social world have been conducted, but none as comprehensive as Piaget's work. Flavell [1970, p. 1027] introduces the construct of role-taking to investigate social-perceptual cognitive processes and the developmental changes that occur in a role-taking activity with a variety of
objects and purposes. Findings of Flavell's studies support Piaget's theory that perceptual perspective ability increases with age. Moore [1958] demonstrated the perceptual role-taking phenomena was applicable to auditory perception, as well as visual perception. Flavell [1970, p. 1028] concludes:

Inferential activity regarding the cognitions, feelings, etc., of others changes with development in at least two ways. First, the child constructs an increasingly rich interpretation of the other's covert processes;... Second, what gets attributed to the other also becomes more accurate and objective, less tainted by the child's own egocentric perspective.

The growing child moves through progressive stages of social-cognitive development with the earliest sensory experiences being receptive--only in nature--with no cognitive involvement. As the child matures, his perceptual and cognitive capacities become more complex with increased dependency on symbolic functioning, moving from egocentric perspective to the ability of assuming the views of others.

There is generally thought to be a close relationship and interdependence between the processes of language and cognition. Flavell [1963, p. 155] expresses the following:

Piaget...stresses the enormous role which---linguistic system play in the development of conceptual thinking. Language is the vehicle...of symbolization without which thought could never become really socialized and thereby logical. But thought is nonetheless far from being a purely verbal affair...In essence, what happens is that language, first acquired through the auspices of a symbolic function which has arisen earlier, will reflexively lend tremendous assistance to the subsequent development of the later...
Much of the argument on the cognitive-language controversy revolves around differences in both the definition of language and cognitive structures and learning. Chomsky [1967], for example, places more emphasis on the dependency of language on innate structures in the organism than on environmental factors, while Watson [1913], on the other hand, views language and cognition as one and the same, "... thought processes are really motor habits of the larynx."

Various cognitive-language positions have been summarized into four general categories by Menyuk [1971, pp. 8-11]:

1. Sensory input leads to the development of primitive symbolic functioning which leads to conceptual thinking and language usage. They are somewhat independent of each other, although language, when acquired, contributes to the development of higher mental functions.

2. Sensory input leads to the development of cognitive functioning and language. They are independent functions, but later language usage influences later conceptual functions.

3. Sensory input leads to cognitive functioning, which leads to language usage. Processes are independent, but there are specific cognitive tasks in which language is always employed.

4. Sensory input leads to the development of symbolic, perceptual and cognitive functioning which then leads to language usage effecting development of higher mental functions.

Slobin [1971, pp. 109-110] emphasizes that language is only one of several means that allows sensory input to be represented in the mental processes. In addition, action and imagery are functional means of representing experiences within cognitive processes.

Bruner, et al. [1956, pp. 30-67] summarizes the results of intensive research on five possible sources of language-dependent cognitive development:
1. Words can serve as "invitations to form concepts"...the very occurrence of unfamiliar words stimulates the child to discover the meanings of those words.

2. Dialogue between adult and child can serve to orient and educate the child, providing an important source of experience and knowledge.

3. School creates the need for new uses of language—particularly context-free and elaborated.

4. Scientific concepts are developed in a culture and are conveyed verbally.

5. The occurrence of conflict between modes of representation can be a source of intellectual development [Slobin, 1971, pp. 119-120].

Summary

Since empirical evidence concerning language and cognitive development of the hearing child is slight, various theoretical positions were reviewed, placing language and cognition as prerequisites and influences for the other. Piagetian observation studies suggest several cognitive developmental stages, moving from one extreme of a language-free, receptive, non-social nature to learning to perceive and interpret the actions of others through social experiences of interaction and language.

Socialization of Deaf Children

Relatively little is known regarding the socialization process experienced by deaf persons. Due to the intangible nature of deafness, accurate early diagnosis is difficult, thus barring research of the very young deaf child. Schlesinger and Meadow [1972, pp.
93-110] studied the social interactions of mothers and their deaf and hearing children in play situations. Forty deaf children and twenty hearing children, ranging in age from two-and-one-half to four years, were video taped with their mothers and observer ratings were obtained. Mothers of deaf children differed most from mothers of hearing children in their general approach to structuring the child's environment. Mothers of deaf children were more controlling, more intrusive, more didactic, more rigid and more critical. In comparison with the hearing children, the observers found the deaf children less happy and buoyant in their general mood, less imaginative and creative in play, less excited about their own accomplishments and enjoyed the companionship of their mothers less than the hearing child.

Collins [1969] observed the communication patterns that occurred between twenty-seven mothers and their deaf pre-school children. Flander's Interaction Analysis system was adapted for use with deaf children and to meet the scope of this study. Analysis of observed interactions indicated that mothers of the deaf children spent twice as much time in directing children's activities than in informing their children. Deaf children's communication with their mothers was characterized as directing and criticizing. Bales Interaction Process Analysis was used by Goss [1970] to compare social-emotional language used by twenty mothers of hearing and deaf children between the ages of two-and-one-half and five-and-eight-tenths years. Mothers of deaf children showed more disagreement, tension and antagonism in their language and directed their children more.
In one of the earlier studies of social maturity of deaf children, Bradway [1937] reported that residential deaf students, ranging in ages five to twenty years, were 27 percent below average social maturity level of hearing children. These findings were substantiated by Myklebust and Burchard [1945].

Deaf pre-school children were reported to be generally more underdeveloped, most specifically in the social and emotional adjustment areas on the Gesell Scale [Myklebust, 1964, p. 213]. Avery [1948] found aurally handicapped children to have a normal social quotient on the Vineland Social Maturity Scale. It should be noted that the population included in Avery's study was limited.

Treacy [1955] investigated the relationships between intelligence and social maturity in a deaf and hard-of-hearing day school population. The most significant finding was that as the deaf child's chronological age increased, he became comparably less socially competent, while the hard-of-hearing child exhibited a positive relationship between increasing age and social competence scores.

While studies like these provide global information on development of deaf children, the interpretation of these results should be pursued with great care. In particular, many of the early studies with deaf children did not account for the additional language variable present in paper and pencil testing methods. Birch and Stuckless [1966], however, did compare deaf children of deaf parents and deaf children of hearing parents on several variables. Since deaf parents of deaf children are usually oriented to a visual communication system, early and meaningful interactive exchanges can be shared
by the parent and the child. Also, unlike the hearing parents of a
deaf child, deaf parents are less likely to be traumatized by the
presence of a deaf child in the family unit. Thus, the researchers
hypothesized that deaf children of deaf parents have a set of social
and educational advantages over the deaf child of hearing parents.
The results indicated a tendency toward better psychosocial adjust­
ment in the children of deaf parents, but these findings were not
statistically significant. In an earlier study, Brill [1960] compared
the social adjustment of (1) deaf children of deaf parents; (2) deaf
children who had deaf siblings and hearing parents; and (3) deaf
children who were the only deaf members of their families. A rating
scale was completed on 135 children by teachers, supervising teachers,
dormitory counselors and supervising counselors. The prediction of
the researcher was that deaf children of deaf parents, or those having
deaf siblings, would show better social adjustment than children with
a history of deafness in the family. The results did not substan­
tiate the hypothesis. There were no significant differences in the
rating of the three groups.

The prevalence of behavior problems were compared between a
hearing public school in Los Angeles and a residential school for the
deaf [Schlesinger and Meadow, 1971]. Findings indicate that more
than 30 percent of the deaf students were evaluated by teachers and
counselors as exhibiting some degree of behavioral problems, while
only 10 percent were reported in the hearing population. These results
may be indicative of an increased probability of behavior problems
among deaf children or they may be indicative of varying standards
of acceptable social behavior between teachers in public school and those in a residential school for the deaf.

Quigley and Frisina [1961] compared the communication abilities, educational achievement and social adjustment of deaf residential and deaf day school pupils. One hundred-twenty subjects were included in the investigation equated for age, intelligence, time spent in school and age of onset of hearing loss. Residential school students showed better adjustment, as measured by a teacher rating scale. This result was largely contingent on the poor adjustment of the male subjects in the day school population.

As evidenced by the variables identified in research reviewed, school settings play an important role in the socialization process. For some deaf children, the school may be his primary and most accurate socializing agent. Levine [1960, pp. 42-43] explains that the deaf child with his lack of communication, depends, to a large extent, on his parents to act as interpreters. Unfortunately, it is a rare occurrence when hearing parents of a deaf child are capable of making interpretations objectively. As the young child is unable to depend upon his parents, the school is then assumed to provide the parent surrogate functions.

No matter how superior the school, it cannot supplant a parent's interests, nor is it equipped to supply the variety of experiences and opportunities a pupil needs to develop into a socially assured individual [Levine, 1960, p. 45].

Summary

In light of the research reviewed, pre-lingual deafness evokes familial and peer interactions different from that of hearing children.
Several investigators have demonstrated that deafness results in social immaturity, but the dilemma remains as to whether the presence of deafness creates a disposition toward unique social behavior or if the presence of deafness evokes responses from the environment that restricts social development.

**Language Development of Deaf Children**

Because of a lack of research regarding the acquisition and development of language in deaf children, the literature has primarily focused on retrospective information. In addition, little is known regarding verbal language development in deaf children, but has utilized the written mode for investigation.

An infant born with a hearing impairment displays vocal behaviors similar to that of hearing infants [Lenneberg, Rebelsky, Nichols, 1965] until the age of six to eight months. At the onset of babbling, the deaf child's vocalizations gradually fade. Without intervention, vocal behavior drops out of the child's repertoire. Due to the absence of stimulation and reinforcement of early linguistic patterns, vocal behavior is eliminated. Brannon and Murray [1966] analyzed spoken language syntax of normal, hard-of-hearing and deaf children. General retardation of language was indicated in the deaf and hard-of-hearing children. Mac Ginite [1964] investigated deaf children's written language ability to supply missing words on a sentence completion task. Results were in agreement with Brannon and Murray. Errors of deaf children were the typical errors of hearing children at a younger age.
Heider and Heider [1941] and Myklebust [1964] investigated spontaneous written structures of deaf children. Results of their investigations were not in accord with the above findings, however, subjects included in the investigation differed in age, the latter being high school students, while Mac Ginite worked with sixth graders. These studies indicated that deaf subjects omitted abstract words and function words, an error which was not common among hearing children.

Studies by Rosenstein and Lerman [1963], Boatner, Stuckless, and Moores [1964] indicate this language deficiency continues through adulthood. Furth [1966] reports that only 4 percent of deaf adults achieve proficient speech and 12 percent achieve linguistic competence.

Summary

Studies reviewed provide evidence for the fact that deficits in auditory acuity hinder the deaf child's linguistic capacity. Speculation exists as to the characteristics of the language deficit. Research provides evidence for the fact that deaf persons exhibit patterns of language unique to the deaf, while other studies demonstrate general retardation in language development.

Language and Cognitive Development of Deaf Children

At the Center for Research on Thinking and Language, Hans Furth has conducted extensive studies of cognitive functioning in deaf persons. In the comparison of deaf and hearing children on a variety of diverse thinking tasks, Furth [1964] concluded that deaf childrens'
cognitive development was similar to hearing children on non-verbal tasks. Deaf children did display age related developmental lags. From these works, Furth further concluded that:

(a) Language does not influence intellectual development in any direct, general, or decisive way.

(b) The influence of language may be indirect or specific and may accelerate development by providing the opportunity for additional experience through giving information and exchange of ideas...

...persons deficient in linguistic experience or skill...may be temporarily retarded during their developmental phase because of a lack of sufficient general experience and...they may be retarded on certain specific tasks in which available word symbols or linguistic habits facilitate solution [1964, p. 160].

In addition to Furth's initial investigations, other psychologists [Rosenstein, 1961; Blank and Bridger, 1966; O'Connor and Hermerlin, 1965] have added to the understanding of cognitive-linguistic functions in deaf persons and support Furth's findings. Oleron and Gum esyan [See Furth, 1964] tested twenty-eight deaf and hearing four to six-year olds on an embedded figures perceptual task. Deaf children performed poorly in comparison to hearing children on meaningful and geometric designs. The investigators concluded that linguistic skill may facilitate internalized symbolic representation, which interferes in the perceptual recognition of the environment.

Suchman [1966] investigated color-form attitude of deaf and hearing children. A majority of hearing children preferred form and had better discrimination accuracy scores for form, while deaf
children preferred color and discriminated color better than hearing children.

Experimental studies of social perception in deaf and hearing adolescents and college students were conducted by Schiff [1972a, 1972b, 1973]. Schiff and Saxe [1972] evaluated deaf and hearing college students' perceptions of static and active interactants. Initially, all subjects were shown filmed social interactions of hearing persons. Deaf subjects' responses indicated they were unwilling or unable to commit themselves to judgment of certain personality characteristics. A second series of filmed scenarios were shown depicting deaf interactants. Being perceived as deaf had no effect on judgment of personality traits.

In a second study by Schiff [1973], 113 deaf and forty-eight hearing adolescents were instructed to label expressions of facial caricatures and six social interaction cartoon films. Results indicated deaf and hearing subjects responded differently to gross motor activity and to social perceptual information conveyed in the face. Hearing subjects extracted more information from the eyes of interactants than deaf subjects. Schiff concluded that deaf and hearing adolescents and college students perceive social information conveyed by the eye and mouth regions of the face and kinetic stimuli differently.

Summary

These studies indicate the selective effects played by language on the cognitive functions. Of particular impact on cognitive
development are those perceptual events influenced by social interactions. Pre-lingual deafness does not preclude cognitive development, but rather, alters the categorization process on which social inferences are dependent.

Conclusions

Social perception occurs only in the presence of a stimulus. The manner in which an individual perceives others in a variety of social situations depends upon his ability to receive cues through sensory mechanisms and infer from the sensory input so as to guide his overt behaviors. The young normal infant is exposed to an environment complete with social stimuli which, initially, are only satisfiers for his primary needs. As the child grows, social stimuli provides him with positive and negative interactions from which he will enter into those behaviors that will satisfy his need for social acceptability. Interactions between social stimuli and the child are characterized as moving from gross motor to language dependent activities. The young child depends on seeing, hearing, feeling, smelling objects to know they exist. In later stages of development, the child does not require the object to be present, but can refer to objects through language to know of their existence. An adolescent begins to develop objects that never existed through his mental and linguistic processes. Just as gross sensory-motor inputs provide the young infant with information regarding his world, so too, does language provide the child, adolescent and adult with information regarding his world.
Social situations are extremely complex and embedded with stimuli. Individuals select cues from a social event that act as stimuli for a behavioral response. Groups of individuals tend to select the same cues due to a common language experience. The interpretation of cues becomes dependent upon an individual's past experience with similar stimuli and the manner in which the stimuli are categorized. Here, again, a common language assists groups of individuals to categorize stimuli in a similar manner. Thus, based on past experience of interactions with others, language and cognition, an individual behaves in a particular manner unique to himself, but sharing the commonalities of language.

Early and severe auditory impairment deprives an individual of access to a significant amount of information in the environment. The very young deaf infant enters into interactions with others in much the same manner as the hearing infant, although the sensory-motor stimuli received is altered by the exclusion or distortion of auditory input. This lack of auditory input does not preclude perception through other sensory mechanisms. Rather, cognition seems to proceed in a manner different from that of a hearing child.

Interactions in which a deaf child engages will necessarily be inhibited by his ability to communicate in a manner similar to others in his environment. Due to perceptual differences and restrictions, deaf children do not engage in the wide variety of early interactive experiences as do his hearing peers. Thus, the early experiences in and around his family and immediate environment can
contribute to the lack of social inference skill development.

By the age of six years, hearing children use language to acquire information regarding immediate and distant environments, while the deaf child is just beginning to label items in his immediate environment with simple words. Because of this tremendous lag, it is doubtful that deaf children learn verbal language in the same developmental stages as hearing children. Through the alteration of sensory input and language development, cognitive processes are also altered. A deaf child learns unique language and perceptual processes affecting his educational and psychosocial learning. He lacks the experience, common language and categorization systems that hearing children enjoy as guides to behavior in novel social environments. Thus, those attributes affecting social inference skills are severely altered in the social development of a deaf child. First, the use of the sensory modalities for the perception of observable characteristics are restricted. Second, without a fixed and common language base from which to proceed, the nature and order to which the deaf child responds is inhibited. Third, due to a limited range of experiences, the deaf child is restricted in the number of associations, categorizations and generalizations he is able to infer from.

Testing Procedures with Deaf Persons

Gathering information regarding pre-lingually deaf persons' capabilities is more an art than it is a science. At the present time, few tests standardized for deaf children or adults exist. The Ontario School Ability Examination [Amoss, 1949] was developed for
use specifically with deaf children four to ten years of age as a measure of intelligence. The Nebraska Test of Learning Aptitude [Hiskey, 1955] includes separate norms and administration procedures for the hearing impaired and the hearing.

Several studies have investigated the social adjustment and social maturity of deaf individuals with a variety of instruments. Scales standardized on normal hearing children used in the investigation of deaf children include:

1. Doll Social Maturity Scale [Streng and Kirk, 1938].

2. Vineland Social Maturity Scale [Bradway, 1937; Avery, 1948; Myklebust and Burchard, 1945; Traecy, 1955].

3. Rating Scales for Pupil Adjustment [Birch and Stuckless, 1966].


Adapted, direct observation systems have been used in several studies by a few investigators [Goss, 1970; Collins, 1969; Craig and Collins, 1970; Craig and Holman, 1973; Collins and Rose, 1974]. These studies have focused on mother-child and teacher-student interactions. Levine [1960, pp. 175-273] and Vernon [1964] have contributed significantly to better understanding of the hazards that can occur when instruments developed for a hearing population are applied to
deaf persons. Vernon [1964, pp. 415-420] provides four basic considerations for testing deaf persons:

1. Use of verbal tests with deaf individuals function as a measure of language deficiency rather than of intelligence, personality, or what is purported to be measured by the test.

2. Tests administered by individuals experienced with hearing impaired subjects are more reliable than tests administered by one not familiar with deaf and hard-of-hearing persons.

3. Group testing of hearing impaired children is a questionable procedure.

4. Use of interpreters who relate the investigator's directions in sign language and fingerspelling to the subject is a highly questionable procedure.

A survey of the use of psychological tests with the deaf was conducted by Levine [1974]. Among the most frequently used tests with deaf children and adults were the Wechsler Performance Scale, Bender Gestalt, Draw-A-Person and House-Tree Person tests. Deaf individuals are often penalized when norms established on hearing populations are applied to deaf persons [Gerweck and Ysseldyke, 1975]. Vernon [1964] cites instances where deaf persons were placed in institutions for the retarded or mentally-ill, based on the misinterpretation of results or incorrect use of tests with deaf individuals. Like Vernon, Lavos [1954] and Gerweck and Ysselkyke [1975] emphasize the need for standardizing instruments on a deaf population for use with deaf people:

Tests should be uniformly standardized on deaf and hearing children for relative position of deaf children are ascertainable only as they are compared with hearing children [Lavos, 1954, p. 310].
Newland [1971, p. 118], in discussing the assumptions underlying psychological assessment states,

It is assumed that the subjects being tested have been exposed to comparable but not necessarily identical acculturation.

Summary

It is evident from the literature reviewed that a dearth of appropriate instrumentation exists for use with deaf subjects. Instruments that have been used in these studies yield information for research purposes, but are of little value as diagnostic tools with which an educator could use and apply directly to rehabilitative and educational programs.
CHAPTER III

RESEARCH METHOD

Sample

The superintendent and program directors of a residential and two non-residential educational programs for the deaf agreed to participate in this study. From these institutions subjects were selected by examination of school records. Only students with the following characteristics were considered for subject selection:

1. Individuals between the ages of 13.0 and 22.0 years.


3. Onset of hearing loss prior to three years of age.

In addition, data regarding the subjects' birth dates and intelligence quotients were obtained. In the event that two or more scores were reported for one parameter, the score bearing the most recent date of administration was used.

I.Q. scores obtained from the school records were a result of individually administered performance tests of intelligence and represented a conglomerate of types of tests. In 73 percent of the sample, the test administered was the Wechsler Performance Scale for
Children, 13 percent were the Leiter International Performance Scale, while the remaining 14 percent included the Grace Arthur Point Scale, the Wechsler and the Hiskey. Due to the dearth of information available regarding relationships among tests when used with deaf individuals, it was impossible to adjust scores to reach maximum efficiency [Vernon, 1969, p. 3].

Ninety-eight deaf adolescents constituted the sample of subjects. Forty-eight of the subjects attended a state residential school for the deaf, while the remaining fifty-six subjects were enrolled in non-residential public school programs for the deaf. The latter group of students represented the total population of subjects meeting selection criteria in two public school programs for the deaf. Residential subjects, in addition to meeting selection criteria, were also selected on the basis of written parental permission.

Subjects ranged in age from 156 to 234 months, with a mean chronological age of 191.29 months. Their hearing thresholds ranged from 60 dB to 110+ dB, with a mean of 89.99 dB (ANSI, 1969) average across the speech range (500 Hz., 1000 Hz., 2000 Hz.) in the better ear. Forty-eight subjects were male and fifty were female. The ranges, means, and standard deviations of ages, hearing loss, and intelligence quotients for each of the educational programs and combined groups can be found in Table 1. Fisher's $t$ [Guilford and Fruchter, 1973, p. 160] for testing the difference between uncorrelated means was calculated for age, hearing loss, and intelligence quotient means between residential and combined non-residential samples. A significant difference ($t = 2.90; p < .01; df = 96$)
<table>
<thead>
<tr>
<th>Small Groups</th>
<th>Sex</th>
<th>CA (Months)</th>
<th>Hearing Loss (ANSI, 1969)</th>
<th>IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>Range</td>
<td>Mean</td>
<td>SD</td>
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<tr>
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<td></td>
<td></td>
<td></td>
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<td>School A</td>
<td>22</td>
<td>163-234</td>
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<td>33.98</td>
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<tr>
<td>Non-Residential</td>
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<td></td>
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<tr>
<td>School B</td>
<td>4</td>
<td>156-209</td>
<td>185.54</td>
<td>16.28</td>
</tr>
<tr>
<td>School C</td>
<td>22</td>
<td>168-225</td>
<td>192.22</td>
<td>13.49</td>
</tr>
<tr>
<td>Combined</td>
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<td>190.91</td>
<td>14.18</td>
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<td>48</td>
<td>156-234</td>
<td>191.29</td>
<td>24.54</td>
</tr>
</tbody>
</table>

*Difference Between Means < .01
between the mean hearing threshold of residential and non-residential samples was found.

**Method of Data Collection**

**Instrument**

The Test of Social Inference comprised the primary measure for this study. It was developed by Edmonson, de Jung, Leland and Leach [1971] to assess "the differences with which one and another person make social interpretation..." [Edmonson et al., 1974, p. 3]. The complete revised edition of the Test of Social Inference [Edmonson et al., 1974] consists of thirty-one photographs of a variety of social situations, accompanied by prescribed questions to be presented by the examiner. The test also consists of two shorter versions consisting of fourteen items, identical to the full thirty-item form, each with two practice items.

Test-retest reliability of the full scale of the Test of Social Inference was demonstrated with three groups of mentally retarded adolescents as well as non-retarded adolescents. Reliability coefficients for each of the mentally retarded groups exceeded .90, with time periods of retest administration ranging from one week to two months [Edmonson et al., 1971; Smith, 1968]. Reliability coefficients for test-retest scores for non-retarded adolescents retested after a one week interval were .74 and .82 for the respective sample groups. Higher mean retest scores were reported for all groups.

Concurrent validity of the Test of Social Inference with 185 institutional and public school educable mentally retarded adolescents
was determined via a teacher behavioral rating scale. Correlation of
Test of Social Inference scores with criterion ratings of behavioral
characteristics follows:

.39 with peer acceptance ratings
.36 with social relationship ratings
.46 with social range ratings
.12 with social invisibility ratings
.26 with attentiveness ratings
.14 with industry ratings
.14 with academic skill ratings
.30 with calmness ratings
.08 with appearance ratings

Correlation coefficients of test scores and teacher ratings
were statistically significant (p < .001) on the social scales of
social range, social relationship, peer acceptance and attentiveness,
and on the additional scale of calmness.

In a pilot study conducted to investigate the feasibility of
the use of the Test of Social Inference with deaf subjects, forty-one
adolescent deaf students attending private and state residential
schools for the deaf were administered the full thirty-item test.
Administration times ranged from forty-five to ninety minutes; since
this duration was neither desirable nor practical, the two shorter
versions—Form C-14 and D-14—were subsequently administered.

Feasibility: Administration of
the Test of Social Inference

Subjects were tested individually in an area removed from
external visual stimuli. Adjustments in the prescribed test format
were necessitated to accommodate the varying communication modes of
deaf subjects. Due to the communication mode of sign language and/or
lipreading common among deaf subject, adaptations included:
1. Instead of examiner being seated next to the subject, the examiner and the subject were seated facing each other to provide for maximum visual communication.

2. Each subject was asked to state his preference of communication mode: speech and audition only; speech, audition and sign language; or speech, audition and written communication. Standard questions accompanying each item were communicated in the mode determined by the subject.

3. Standard questions communicated via sign language necessitated restructuring some of the syntactical structure to equate the semantics conveyed by sign language and the English language. An example of transformation made is exhibited in the following:

   Question 3A. Communication via the verbal mode:

   "Why are they trying to fix it themselves?"

   Communication via sign language:

   "Why, themselves (pointing to ladies in the picture) fix tire, try fix, why?"

4. Because item difficulty and discrimination could not be assumed as equivalent for deaf and educable mentally retarded population, all probe questions provided in the full thirty-item Test of Social Inference were used in lieu of the abbreviated questioning procedures accompanying test forms C-14 and D-14.

Recording of subject's responses to questions on the Test of Social Inference was also modified to accommodate the examiner's and subject's reliance on visual communication. The Test of Social Inference [Edmonson, et al., 1974] includes a booklet for recording appropriate responses and recording any deviant inferences which may necessitate further interpretation. This procedure proved to be
cumbersome and time consuming when sign language and lipreading were used. Instead, the examiner recorded the subject's responses on an audio cassette recorder. In the event that the subject's speech was unintelligible, the examiner reverse interpreted the subject's signed responses, i.e., the examiner verbalized verbatim the subject's signed or gestured responses. Following test administration, the responses were transcribed verbatim into the written mode for scoring and analysis. The subjects were administered test forms C-14 and D-14 by random assignment.

Reliability: Scoring Procedures and Scorer Reliability

Test of Social Inference scores were obtained from the transcription of audio recordings of subject's responses. The total test score for each subject was the result of the standard pass-fail method [Edmonson, et al., 1974, p. 43]. The subject passed each item if he gave two or more appropriate inference responses to an item. If fewer than two acceptable inference responses were given, the subject failed the item. Thus, the maximum pass score on each of the alternate forms was fourteen. Creditable inferences are provided in the test manual [Edmonson, et al., 1974, pp. 46-75]. An adaptation was made in the scoring of item number nine on form D-14, which depicts a small excited boy running up a walkway ahead of his parents. Several students responded that the little boy was coming home from school. Since this is a valid inference based on the experiences of residential students, a creditable inference was added to this item.
All items were scored by the examiner. In addition, five graduate students familiar with the field of deafness and deaf children independently scored five tests each, following the directions in the test booklet. These twenty-five sample tests were randomly selected from the total group of ninety-eight tests. Eighty-four percent of the twenty-five tests scored by the graduate students were in agreement with those scored by the examiner, while the remaining four tests differed by no more than one Test of Social Inference point.

Validity: Behavior Ratings

In order to assess the subject's observable social behavior, Behavioral Rating Scales [Edmonson, et al., 1971] were employed in this investigation. These scales include eight observable categories of behavior; four of the categories focus on various aspects of social adequacy: social relationships, peer acceptance, social range, and social invisibility. Definitions for each of these categories and their continuum are discussed in Edmonson, et al., [1971, pp. 2.22-23 and 3.1-34]. Four additional categories focus on behaviors not directly indicative of social adequacy; these categories include appearance, industry, calmness and academic skill, as defined by Parnicky and Kahn [1963]. A sample of the rating scale can be found in the Appendix.

Behavioral Rating Scale Administration -- With the cooperation of the supervising teachers and principals of the respective schools, the rating scales were distributed to those teachers, and in the case of the residential school, to the dormitory counselors, most familiar with the subjects. At the time of distribution, the
investigator discussed with the teachers and counselors the overall purpose of the study. Raters were requested to read the criteria to be used in evaluating subject's behavior for each category described (See Appendix) on the rating scale, and to circle the descriptor that most nearly portrayed the subject's behavior. Each rater was provided with a stamped-addressed envelope in which the Behavioral Rating Scale forms were returned to the investigator. Of the ninety-eight Behavioral Rating Scales distributed to teachers, 87 percent completed forms were returned. Forty-two Behavioral Rating Scales were distributed to the dormitory counselors with 81 percent completed forms returned. Also, to insure subject anonymity, identification numbers were assigned to subjects' responses, personal data information and Behavioral Rating Scales.
CHAPTER IV

RESULTS

The Test of Social Inference [Edmonson et al., 1974] was administered to ninety-eight adolescent deaf students attending residential and non-residential educational programs for the deaf. The following results describe test performance and subject performance, including variables of sex, age, degree of hearing loss and type of school in accordance with the objective stated in Chapter I, page 3.

Feasibility: Adaptations of the Test of Social Inference for Use with Deaf Adolescents

Due to the variety of communication modes employed by deaf persons and the examiner's and subject's reliance on visual cues, several adaptations were made in the standard administration procedures. These adaptations have been discussed in Chapter III, page 39.

Characteristics of test items were analyzed for test forms C-14 and D-14 to assess the internal effectiveness of the Test of Social Inference when used with a deaf adolescent population. This item analysis included measures of internal test reliability—item difficulty, item discrimination—and item validity.
Item difficulty indices are reported in Table 2 for test form C-14 and Table 3 for form D-14. Mean item difficulty for C-14 and D-14 were .543 and .502, respectively. Distribution of item difficulty for the alternate forms are reported in Tables 4 and 5.

The discrimination index for a particular item indicates that those students whose total test score is high have a greater probability of passing a particular test item, while students scoring low have a greater probability of failing the item. High and low scoring individuals were defined as those subjects whose Test of Social Inference scores are included in the upper or lower 27.50 percent of the total group [Kelly, 1939]. The discrimination indices reported in Tables 2 and 3 are percentages of correct responses in the upper and lower groups. Mean item discrimination for form C-14 was .502 and .463 for form D-14. Item discrimination distributions are reported in Tables 4 and 5.

The corrected phi coefficient [Guilford and Fruchter, 1973, p. 307] was computed to estimate item validity through item-to-total score relationships of high and low scoring individuals. Phi coefficients (Table 2 and 3) for form C-14 items range from .002 to .985, while on form D-14 phi coefficients ranged from .383 to .988.

Standard error of measurement and Kuder-Richardson "Formula 20" [Guilford and Fruchter, 1973, p. 416] were used to estimate test reliability. The Kuder-Richardson "Formula 20" estimates the consistency between items through a reliability coefficient derived from the total and item test variances. Reliability estimates for forms C-14 and D-14 were .645 and .636, respectively. Standard error of
<table>
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<th>Item Number</th>
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<th>Difficulty</th>
<th>Discrimination Index</th>
<th>Corr. Phi Coefficient</th>
<th>Significance</th>
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<tr>
<td>1</td>
<td>Boy and Truck</td>
<td>.420</td>
<td>51.3</td>
<td>.836</td>
<td>.001</td>
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<tr>
<td>2</td>
<td>Women and Flat Tire</td>
<td>.440</td>
<td>44.2</td>
<td>.760</td>
<td>.01</td>
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<td>3</td>
<td>Fishing Camp</td>
<td>.300</td>
<td>59.0</td>
<td>.905</td>
<td>.001</td>
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<tr>
<td>4</td>
<td>Mother, Boy, Turtle</td>
<td>.440</td>
<td>68.6</td>
<td>.951</td>
<td>.001</td>
</tr>
<tr>
<td>5</td>
<td>Peasants and Coffin</td>
<td>.380</td>
<td>75.0</td>
<td>.985</td>
<td>.001</td>
</tr>
<tr>
<td>6</td>
<td>Lady in Train</td>
<td>.300</td>
<td>51.3</td>
<td>.836</td>
<td>.001</td>
</tr>
<tr>
<td>7</td>
<td>Tornado</td>
<td>.340</td>
<td>51.3</td>
<td>.836</td>
<td>.001</td>
</tr>
<tr>
<td>8</td>
<td>Doghouse</td>
<td>.480</td>
<td>75.6</td>
<td>.979</td>
<td>.001</td>
</tr>
<tr>
<td>9</td>
<td>Tricycle Delivered</td>
<td>.720</td>
<td>60.9</td>
<td>.911</td>
<td>.001</td>
</tr>
<tr>
<td>10</td>
<td>Tunisian Leader</td>
<td>.740</td>
<td>30.1</td>
<td>.661</td>
<td>.02</td>
</tr>
<tr>
<td>11</td>
<td>Ragpicker</td>
<td>.760</td>
<td>45.5</td>
<td>.809</td>
<td>.001</td>
</tr>
<tr>
<td>12</td>
<td>Battle of New Orleans</td>
<td>.980</td>
<td>0.0</td>
<td>.000</td>
<td>N.A.</td>
</tr>
<tr>
<td>13</td>
<td>Greeting Visitors</td>
<td>.660</td>
<td>52.6</td>
<td>.844</td>
<td>.001</td>
</tr>
<tr>
<td>14</td>
<td>Skywriter</td>
<td>.640</td>
<td>37.2</td>
<td>.707</td>
<td>.01</td>
</tr>
</tbody>
</table>

N = 50
TABLE 3
DIFFICULTY INDICES, DISCRIMINATION INDICES, AND CORRECTED PHI COEFFICIENTS FOR FORM D-14 TEST OF SOCIAL INFERENCE ITEMS

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description of Item</th>
<th>Difficulty</th>
<th>Discrimination Index</th>
<th>Corr. Phi Coefficient</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Baseball Shoe</td>
<td>.438</td>
<td>41.5</td>
<td>.740</td>
<td>.01</td>
</tr>
<tr>
<td>2.</td>
<td>Space Car</td>
<td>.771</td>
<td>37.9</td>
<td>.707</td>
<td>.01</td>
</tr>
<tr>
<td>3.</td>
<td>Man and Dog</td>
<td>.563</td>
<td>29.2</td>
<td>.440</td>
<td>.05</td>
</tr>
<tr>
<td>4.</td>
<td>Japanese Runner</td>
<td>.375</td>
<td>70.3</td>
<td>.965</td>
<td>.001</td>
</tr>
<tr>
<td>5.</td>
<td>Helicopter</td>
<td>.604</td>
<td>57.9</td>
<td>.884</td>
<td>.001</td>
</tr>
<tr>
<td>6.</td>
<td>Boy and Girl at Station</td>
<td>.333</td>
<td>48.2</td>
<td>.818</td>
<td>.001</td>
</tr>
<tr>
<td>7.</td>
<td>Biology Student</td>
<td>.688</td>
<td>46.7</td>
<td>.853</td>
<td>.001</td>
</tr>
<tr>
<td>8.</td>
<td>Appliance Delivery</td>
<td>.521</td>
<td>35.9</td>
<td>.673</td>
<td>.02</td>
</tr>
<tr>
<td>9.</td>
<td>Boy and Parents</td>
<td>.333</td>
<td>48.2</td>
<td>.818</td>
<td>.001</td>
</tr>
<tr>
<td>10.</td>
<td>Convertibles under Bridge</td>
<td>.438</td>
<td>79.0</td>
<td>.988</td>
<td>.001</td>
</tr>
<tr>
<td>11.</td>
<td>Wheelchair Girls</td>
<td>.604</td>
<td>36.9</td>
<td>.685</td>
<td>.01</td>
</tr>
<tr>
<td>12.</td>
<td>Unhappy People</td>
<td>.771</td>
<td>39.0</td>
<td>.750</td>
<td>.01</td>
</tr>
<tr>
<td>13.</td>
<td>Fourth of July Parade</td>
<td>.521</td>
<td>57.9</td>
<td>.884</td>
<td>.001</td>
</tr>
<tr>
<td>14.</td>
<td>School Play</td>
<td>.833</td>
<td>19.0</td>
<td>.383</td>
<td>.10</td>
</tr>
</tbody>
</table>

N = 48
### TABLE 4

**MEAN ITEM DIFFICULTY AND DISTRIBUTION FOR TEST OF SOCIAL INFERENCE FORM C-14**

<table>
<thead>
<tr>
<th>Range</th>
<th>Number Of Items</th>
<th>Percentage Of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.81-1.00</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>.71-.80</td>
<td>5</td>
<td>36</td>
</tr>
<tr>
<td>.41-.60</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>.21-.40</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>.00-.20</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Mean Item Difficulty = .543

<table>
<thead>
<tr>
<th>Range</th>
<th>Number Of Items</th>
<th>Percentage Of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.81-1.00</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>.61-.80</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>.41-.60</td>
<td>7</td>
<td>50</td>
</tr>
<tr>
<td>.21-.40</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>.00-.20</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Below .00</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Mean Item Discrimination = .502
TABLE 5
MEAN ITEM DIFFICULTY AND DISTRIBUTION FOR TEST OF SOCIAL INFERENCE FORM D-14

<table>
<thead>
<tr>
<th>Range</th>
<th>Item Difficulty</th>
<th>Number Of Items</th>
<th>Percentage Of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.81-1.00</td>
<td></td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>.61-.80</td>
<td></td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>.41-.60</td>
<td></td>
<td>7</td>
<td>50</td>
</tr>
<tr>
<td>.21-.40</td>
<td></td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>.00-.20</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Mean Item Difficulty = .557

<table>
<thead>
<tr>
<th>Range</th>
<th>Item Discrimination</th>
<th>Number Of Items</th>
<th>Percentage Of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.81-1.00</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>.61-.80</td>
<td></td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>.41-.60</td>
<td></td>
<td>6</td>
<td>43</td>
</tr>
<tr>
<td>.21-.40</td>
<td></td>
<td>5</td>
<td>36</td>
</tr>
<tr>
<td>.00-.20</td>
<td></td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Below .00</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Mean Item Discrimination = .463
measurement for form C was 1.78 and 1.77 for form D.

In summary, while major alterations were made in the standard administration procedures, internal reliability and validity of the Test of Social Inference forms C-14 and D-14 was high. Results of item performance in terms of item difficulty, item discrimination and inter-item correlation indicate item reliability and item validity.

Reliability: Subject Performance on the Test of Social Inference

Form C-14 was administered to twenty-one residential and twenty-nine non-residential subjects with a mean age of 191.54 months, mean hearing threshold of 90.04 dB (ANSI, 1969) and mean I.Q. score of 101.02. Test form D-14 was administered to twenty-one residential and twenty-seven non-residential subjects with a mean age of 191.04 months, mean hearing threshold of 89.71 dB and a mean I.Q. score of 96.25.

Test of Social Inference scores ranged from zero to twelve points on both forms with a mean score of 6.40 on form C-14 and a mean of 6.21 on form D-14. Using Fisher's $t$ [Guilford and Fruchter, 1973, p. 160] for testing differences between uncorrelated means, no statistically significant differences were found between age, hearing threshold, I.Q. scores and Test of Social Inference score means of the sample groups.

In light of the relative equivalency (Table 6) on test forms C-14 and D-14 on internal consistency of test items, and the characteristics of age, hearing threshold and I.Q. scores and social
TABLE 6
RANGE, MEANS AND STANDARD DEVIATIONS OF AGES, HEARING LOSSES AND INTELLIGENCE QUOTIENTS OF SAMPLE GROUPS ADMINISTERED TEST FORM C-14 AND D-14

<table>
<thead>
<tr>
<th>Test Form</th>
<th>Type Of School</th>
<th>Sex</th>
<th>Age In Months</th>
<th>Hearing Threshold</th>
<th>IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>NR</td>
<td>M</td>
<td>F</td>
<td>Range</td>
</tr>
<tr>
<td>C-14</td>
<td>21</td>
<td>29</td>
<td>20</td>
<td>30</td>
<td>156-227</td>
</tr>
<tr>
<td>D-14</td>
<td>21</td>
<td>27</td>
<td>28</td>
<td>20</td>
<td>163-234</td>
</tr>
</tbody>
</table>
inference scores, these two groups were combined to facilitate further analysis. Thus, test form is not considered a variable.

Validity: Use of the Test of Social Inference with Deaf Adolescents

Teacher and dormitory counselor ratings on the Behavioral Rating Scales (See Appendix) functioned as criterion measures for estimating the validity of the use of the Test of Social Inference with deaf adolescents. Scores for the rating scales were obtained by assigning numerical values to criteria:

1 = Very Poor 4 = Good
2 = Poor 5 = Very Good
3 = Fair

Teacher and dormitory counselor ratings for each category of behavior were scored with the numerical value assigned to the criterion. Subjects received a score for each category: social range, social relationships, peer acceptance, social invisibility, appearance, industry, calmness and academic skill.

Pearson product moment correlations were computed between Test of Social Inference scores and teacher ratings as well as counselor ratings for each category of behavior. Table 7 reports the correlation coefficients of test scores with teacher ratings for forty-four females and forty-one males. Examination of the table indicates correlation coefficients between social inference scores and teacher ratings on the social scales are statistically significant \( (p < .05) \) for females on the social adequacy dimensions of social relationships and social invisibility, while teacher ratings of male social behavior is statistically significantly \( (p < .05) \) correlated with social range.
TABLE 7  
CORRELATION COEFFICIENTS OF TEST OF SOCIAL INFERENCE SCORES  
FORMS C-14 AND D-14 COMBINED WITH TEACHER RATINGS  
FOR ADOLESCENT DEAF MALES AND FEMALES  

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>Social Adequacy Scales</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Social Range</td>
<td>Social Relationships</td>
<td>Peer Acceptance</td>
<td>Social Invisibility</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>44</td>
<td>.20</td>
<td>.36*</td>
<td>.20</td>
<td>.28*</td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>41</td>
<td>.27*</td>
<td>.08</td>
<td>.01</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td>Combined</td>
<td>85</td>
<td>.26*</td>
<td>.24*</td>
<td>.12</td>
<td>.19*</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>Additional Scales</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Appearance</td>
<td>Industry</td>
<td>Calmness</td>
<td>Academic Skill</td>
</tr>
<tr>
<td>Females</td>
<td>44</td>
<td>.23*</td>
<td>.17</td>
<td>.40*</td>
<td>.35*</td>
</tr>
<tr>
<td>Males</td>
<td>41</td>
<td>.12</td>
<td>.04</td>
<td>.06</td>
<td>.18</td>
</tr>
<tr>
<td>Combined</td>
<td>85</td>
<td>.21*</td>
<td>.15</td>
<td>.21*</td>
<td>.28*</td>
</tr>
</tbody>
</table>

*p < .05
Results of correlations on scales not directly indicative of social adequacy with Test of Social Inference scores indicate statistically significant \( p < .05 \) correlations on the dimensions of academic skill, calmness and appearance for female subjects. No statistically significant correlations were found for male subjects on the additional scales.

Table 8 reports the correlations between dormitory counselor ratings and test scores. No statistically significant \( p < .05 \) relationships on any dimension of the Social Behavior Rating Scale were found.

Relationship Between Test of Social Inference Scores and Sex of Subjects

Forty-eight male and fifty female subjects were included in the investigation. Examination of Table 9 indicates no statistical significance \( p < .05, df = 96 \) between male and female group means on characteristics of age \( t = 1.51 \), hearing threshold \( t = 1.46 \) or I.Q. scores \( t = 0.20 \). Test of Social Inference scores for male and female subjects ranged from one to eleven and zero to twelve points, respectively, with a mean score of 5.90 for male subjects and a mean of 6.72 social inference points for female subjects. No statistically significant differences were found between male and female group means \( t = 1.49, df = 96 \). Frequency distribution of social inference scores for male and female groups (Figure 1) illustrate the similarity of distribution of scores between these groups.
### TABLE 8
CORRELATION COEFFICIENTS OF TEST OF SOCIAL INFEERENCE SCORES
FORMS C-14 AND D-14 COMBINED WITH DORMITORY COUNSELOR
RATINGS FOR ADOLESCENT DEAF MALES AND FEMALES

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>Social Adequacy Scales</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Social Range</td>
<td>Social Relationships</td>
<td>Peer Acceptance</td>
<td>Social Invisibility</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>18</td>
<td>.16</td>
<td>.16</td>
<td>.26</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>16</td>
<td>-.06</td>
<td>-.06</td>
<td>-.22</td>
<td>-.17</td>
<td></td>
</tr>
<tr>
<td>Combined</td>
<td>34</td>
<td>.08</td>
<td>.09</td>
<td>-.02</td>
<td>.03</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>Additional Scales</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Appearance</td>
<td>Industry</td>
<td>Calmness</td>
<td>Academic Skill</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>18</td>
<td>.09</td>
<td>.23</td>
<td>.04</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>16</td>
<td>-.18</td>
<td>-.14</td>
<td>.02</td>
<td>-.33**</td>
<td></td>
</tr>
<tr>
<td>Combined</td>
<td>34</td>
<td>.12</td>
<td>.20</td>
<td>.14</td>
<td>-.35***</td>
<td></td>
</tr>
</tbody>
</table>

*Dormitory Counselors did not feel qualified to respond to this rating.

**N = 12

***N = 14
### TABLE 9
RANGE, MEANS AND STANDARD DEVIATIONS OF AGES, HEARING LOSSES AND INTELLIGENCE QUOTIENTS OF FIFTY FEMALE AND FORTY-EIGHT MALE DEAF ADOLESCENTS

<table>
<thead>
<tr>
<th>Sex</th>
<th>Type Of School</th>
<th>Age In Months</th>
<th>Hearing Threshold</th>
<th>IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Range</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Females</td>
<td>R</td>
<td>156-225</td>
<td>187.60</td>
<td>29.56</td>
</tr>
<tr>
<td></td>
<td>NR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>20</td>
<td>165-234</td>
<td>195.15</td>
<td>17.40</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combined</td>
<td>42</td>
<td>156-234</td>
<td>191.30</td>
<td>24.54</td>
</tr>
</tbody>
</table>
Figure 1. Percent of Male and Female Subjects for Test of Social Inference Score Intervals
Relationship Between Test of Social Inference Scores and Type of School Attended

Group characteristics of forty-two residential and fifty-six non-residential subjects are reported in Table 10. The mean hearing threshold ($\overline{X} = 94.64$) of residential subjects was found to be statistically significantly lower ($t = 2.90, p < .01, df = 96$) than the mean hearing threshold ($\overline{X} = 85.30$) of non-residential subjects. $t$ values calculated for group means of age ($t = .18$) and I.Q. scores ($t = .18$) were not statistically significant ($p < .05, df = 96$).

Test of Social Inference scores for residential and non-residential students ranged from one to twelve and zero to twelve points, respectively. The mean score of residential subjects was 5.95, while the mean score of non-residential students was 6.59. No statistically significant difference ($p < .05, df = 96$) was found between social inference score group means ($t = 1.14$). Figure 2 illustrates the distribution and mean of Test of Social Inference scores for residential and non-residential students.

Comparison of Test of Social Inference Scores by Type of School, Hearing Threshold and I.Q. Scores

Subject's Test of Social Inference scores were assigned to groups by: (a) type of school attended—residential and non-residential, (b) high hearing threshold (60-79 dB) and low hearing threshold (80+ dB) and (c) low I.Q. scores (60-89) and high I.Q. scores (90+). Table 11 presents the means and standard deviations for each of the eight groups. Examination of Table 11 suggests that subjects with
TABLE 10
RANGE, MEANS AND STANDARD DEVIATIONS OF AGES, HEARING LOSSES
AND INTELLIGENCE QUOTIENTS OF FORTY-TWO RESIDENTIAL
AND FIFTY-SIX NONRESIDENTIAL DEAF ADOLESCENTS

<table>
<thead>
<tr>
<th>Type Of School</th>
<th>Sex</th>
<th>Age In Months</th>
<th>Hearing Threshold</th>
<th>IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>Range</td>
<td>Mean</td>
</tr>
<tr>
<td>Residential</td>
<td>22</td>
<td>20</td>
<td>163-234</td>
<td>191.81</td>
</tr>
<tr>
<td>Non-residential</td>
<td>26</td>
<td>30</td>
<td>156-225</td>
<td>190.91</td>
</tr>
<tr>
<td>Combined</td>
<td>48</td>
<td>50</td>
<td>156-234</td>
<td>191.29</td>
</tr>
</tbody>
</table>

*Difference between means p < .01
Figure 2. Percent of Residential and Nonresidential Subjects for Test of Social Inference Score Intervals
<table>
<thead>
<tr>
<th>Hearing Threshold/Type of School</th>
<th>Low I.Q. (60-89)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High 60-79 dB</td>
<td>Low 80 dB+</td>
<td>Combined</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
<td>N</td>
</tr>
<tr>
<td>Non-residential</td>
<td>9</td>
<td>5.56</td>
<td>2.06</td>
<td>7</td>
</tr>
<tr>
<td>Residential</td>
<td>3</td>
<td>3.33</td>
<td>1.94</td>
<td>10</td>
</tr>
<tr>
<td>Combined</td>
<td>12</td>
<td>5.00</td>
<td>2.08</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High I.Q. (90+)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-residential</td>
<td>10</td>
<td>7.50</td>
<td>2.62</td>
</tr>
<tr>
<td>Residential</td>
<td>5</td>
<td>5.40</td>
<td>1.20</td>
</tr>
<tr>
<td>Combined</td>
<td>15</td>
<td>6.80</td>
<td>2.71</td>
</tr>
</tbody>
</table>
low I.Q. scores obtained lower Test of Social Inference scores than subjects with high I.Q. scores. These results also suggest residential subjects with high hearing thresholds and high I.Q. scores obtained lower Test of Social Inference scores than other high I.Q. non-residential and residential groups.

These tentative findings were subjected to a three factor, fixed model, analysis of variance [Kennedy, 1974, pp. 710-732], using unweighted means [Myers, 1966, pp. 102-110]. The results are summarized in Table 12. Since the main effects for intelligence proved to be significant ($F = 11.32; \text{df} = 1/90; p < .001$), post-hoc multiple comparisons were performed using Dunn's method. It was found that the mean Test of Social Inference scores for non-residential high and low I.Q. score subjects exceeded residential low I.Q. score subjects ($p < .05$). Therefore, of the variables considered, the I.Q. score seems to be the most salient, particularly for subjects attending residential school.
<table>
<thead>
<tr>
<th>Groups</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Type of School)</td>
<td>1</td>
<td>2.71</td>
<td>2.71</td>
<td>2.51</td>
</tr>
<tr>
<td>B (Hearing Threshold)</td>
<td>1</td>
<td>.12</td>
<td>.12</td>
<td>.11</td>
</tr>
<tr>
<td>C (I.Q. Scores)</td>
<td>1</td>
<td>12.23</td>
<td>12.23</td>
<td>11.32*</td>
</tr>
<tr>
<td>AB</td>
<td>1</td>
<td>1.99</td>
<td>1.99</td>
<td>1.84</td>
</tr>
<tr>
<td>AC</td>
<td>1</td>
<td>.05</td>
<td>.05</td>
<td>.05</td>
</tr>
<tr>
<td>BC</td>
<td>1</td>
<td>.42</td>
<td>.42</td>
<td>.39</td>
</tr>
<tr>
<td>ABC</td>
<td>1</td>
<td>.04</td>
<td>.04</td>
<td>.04</td>
</tr>
<tr>
<td>S/ABC (adj.)</td>
<td>90</td>
<td>97.28</td>
<td>1.08</td>
<td></td>
</tr>
</tbody>
</table>

*p < .001
CHAPTER V

DISCUSSIONS, LIMITATIONS, IMPLICATIONS AND SUMMARY

The primary purpose of this study was to investigate the feasibility, reliability and validity of employing the Test of Social Inference [Edmonson et al., 1974] with deaf adolescents and to examine the effects of age, sex, type of school attended, intelligence quotient and hearing threshold on the Test of Social Inference scores. Ninety-eight deaf adolescents, ranging in ages from thirteen to twenty-one years, with an average hearing threshold across the speech range below 60 dB (ANSI, 1969) in the better ear, were individually administered the adapted Test of Social Inference. Forms C-14 and D-14 were assigned at random to members of each group for administration.

Discussions

In attempting to assess personal and social characteristics of deaf persons, test standards and norms of hearing persons have traditionally been applied to the deaf population with the assumption that deaf and hearing persons comprise a common population. While deaf and hearing subjects live under common social norms, the acculturation of deaf persons is markedly different, therefore, no attempt was made in this investigation or analysis of data to draw comparisons between deaf and hearing populations. Rather, analysis focuses on
test characteristics when used with deaf adolescents.

Thus, the first question posed in the investigation was:

1. Can the Test of Social Inference be adapted for use with deaf adolescents?

(a) What adaptations need to be made in the administration of the test?

Several adaptations were made in the administration procedures of the test to accommodate the communication needs of deaf persons. First, the examiner was seated facing the subject instead of next to the subject. Secondly, probe questions for each item were communicated in the modes preferred by the subject. Verbal, auditory, as well as sign language and written modes, were available to the subject. Thirdly, restructuring of some syntactical structures of the standard questions provided in the test guide was necessary to equate the semantics conveyed by sign language and the English language. Fourth, subjects' responses were audio-recorded. In the event the subject's speech was not intelligible, the examiner reverse interpreted--verbalized verbatim--the subject's signed or gestured responses.

Item analysis was performed to assess the effects of the adaptations on test performance. Internal-consistency reliability was indicated by mean item difficulty indices of .543 and .502 for form C-14 and D-14, respectively. While the mean item difficulty indices obtained were near ideal, results of item reliability, Kuder-Richardson "Formula 20" of .645 for form C-14 and .636 for form D-14 were below the ideal of at least .94 [Kelley, 1927, pp. 21], but close to the acceptable range of .70 to .98 [Guilford and Fruchter, 1973, p. 92].
Item validity as measured by the discrimination indices and phi coefficients indicate that one item on each of the test forms fails to contribute to test item validity. Replacement of these items could provide additional reliability and validity among items.

Considering the major adaptations made in the test administration and recording procedures, the internal item reliability and validity for test forms C-14 and D-14 appear to approach acceptable levels when used with deaf adolescents. Therefore, it does seem possible to use the Test of Social Inference with deaf adolescents.

(b) What adaptations need to be made in the scoring procedures?

Transcriptions of audio recordings of subjects' responses were scored following procedures provided in the test manual [Edmonson et al., 1974, pp. 46-75]. A credible inference was added to item number nine on form D-14, based on the experiences of residential school children.

Five graduate students enrolled in a deaf education training program independently scored five tests each. Scorer agreement ranged from 75 percent to 100 percent with a mean scorer agreement of 84 percent reached between graduate student scores and the examiner's scores. Considering the variety of language competencies of the deaf children and the graduate student's lack of familiarity with the Test of Social Inference, this level of scorer agreement was considered to be good. Thus, no further adaptations in scoring procedures were necessary.

2. Is the adapted Test of Social Inference for deaf adolescents a valid measure of social inference skills when compared with teacher
ratings of deaf students' social behavior adequacy and other aspects of student behavior?

Teacher ratings on the Behavioral Rating Scales were obtained for each category of behavior: social range, social relationships, peer acceptance, social invisibility, appearance, industry, calmness and academic skill. Correlation coefficients were computed between social inference scores and teacher ratings for male and female subjects. Of the four social adequacy scales, correlations were statistically significant (p < .05) on the dimensions of social relationships and social invisibility, while ratings of male social behavior were statistically significantly correlated with social range only. On the additional scales of behavior, Test of Social Inference scores were statistically significant (p < .05) for females on appearance, calmness and academic skill, while no significant correlations were found for males.

These findings fail to indicate that the adapted Test of Social Inference is a valid measure of a trait related to teacher ratings of social adequacy on the Behavioral Rating Scales. Since the scales were originally developed for use with mentally retarded individuals, their validity as a criterion measure of social adequacy of deaf students must be questioned. Therefore, the Test of Social Inference may be measuring an individual's ability to interpret social cues, although findings in the investigation do not provide this evidence.

In addition, the question must be raised as to the teacher's ability to rate social behavior. Dormitory counselor ratings of student social adequacy also failed to provide any support for the
validity of the Test of Social Inference. Therefore, a viable criterion measure of social adequacy may be best obtained through direct observation of the student in a variety of social situations.

3. Is there a difference between social inference scores of deaf males and females as determined by the Test of Social Inference?

Forty-eight male and fifty female subjects were included in the investigation. No statistically significant (p < .05) differences were found between male and female subjects' mean Test of Social Inference scores.

4. Is there a difference between social inference scores of residential and non-residential deaf students as determined by the Test of Social Inference?

Forty-two residential and fifty-six non-residential subjects were administered the Test of Social Inference. No statistically significant (p < .05) difference was found between score means of residential and non-residential students. These findings are not in agreement with those of Quigley and Frisina [1961] in which residential school students showed better social adjustment than non-residential students on teacher rating scales. However, residential subjects had statistically significantly (p < .01) lower hearing thresholds than non-residential students. Since hearing threshold may effect subjects' social inference scores, the following question was posed to examine the interaction effects of the variables.

5. Is there a difference between social inference scores of groups with varying degrees of hearing loss, I.Q. scores and type of school attended as determined by the Test of Social Inference?
A three factor analysis of variance was performed to more efficiently assess the variable effects of *Test of Social Inference* performance scores. Each factor consisted of two levels: (a) residential and non-residential school; (b) high I.Q. scores (90+) and low I.Q. scores (60-89); and (c) low hearing threshold (80+dB) and high hearing threshold (60-79 dB). Findings indicate that intelligence was a statistically significant ($p < .001$) factor, while hearing threshold and type of school attended did not appear to affect social inference scores. Therefore, I.Q. scores of deaf subjects appears to be the most salient variable affecting the *Test of Social Inference* performance. Furthermore, residential subjects with low I.Q. scores obtained statistically significantly ($p < .05$) lower scores than non-residential low I.Q. score subjects and residential and non-residential high I.Q. score subjects. It should be noted that the I.Q. scores used did not represent a common test, but a collection of individually administered performance intelligence tests. Thus, some error of measurement may have occurred due to the lack of uniformity among test forms, although this effect is considered minimal.

Since intelligence testing of the deaf individual is typically performance based and verbal performance tests are usually avoided, this close relationship between an essentially verbal test and performance based I.Q. scores requires careful consideration and further investigation. In Vernon's [1964, pp. 415-420] basic consideration for testing deaf persons, he states that,

> Verbal tests with deaf individuals function as a measure of language deficiency rather than of intelligence, personality or what is purported to be measured by the test.
The findings of this investigation indicate that performance on the Test of Social Inference may be a measure of verbal functioning and, therefore, could serve as a useful ancillary tool to the traditional tests of intelligence employed with deaf individuals.

**Limitations and Sources of Error**

Consideration needs to be given to a number of limitations and sources of error within this investigation and with the problems associated with human assessment. First, the assignment of a number to a human characteristic places an individual in a relative position when compared to other subjects. While the number of subjects included in the study was adequate to perform an efficient item analysis, the number and size of the sample groups were insufficient to draw affirmative conclusions as to the relative performance of individuals, as well as the validity of the test when used with deaf adolescents and groups. Secondly, while statistical tests help to account for subject variance, they cannot control for external events, i.e., the subject or examiner doesn't feel good on a particular day. Third, data concerning examiner reliability were not available due to the lack of availability of individuals proficient in sign language. Fourth, the Behavioral Rating Scale employed as a measure of concurrent validity may not be a valid measure of social adequacy when used with deaf adolescents. In addition, teachers of deaf adolescents may not be the appropriate judges of social adequacy of deaf adolescents. Fifth, no distinctions were made between students enrolled in either a residential or non-residential program throughout their educational experience and those
students who may have transferred from a non-residential to a residential setting.

Implications

The execution of this study and the analysis of data has the following implications:

1. With adaptations, the Test of Social Inference appears to be an internally reliable measure. Thus, adaptations similar to those employed in this investigation applied to other selected verbal tests may provide improved measurement procedures with deaf individuals.

2. The adapted Test of Social Inference, as a verbal test, appears to be a measure of verbal functioning of deaf adolescents. Therefore, inquiries should be made as to its possible use as an ancillary measure to the I.Q. performance scores of deaf subjects.

3. Since the Test of Social Inference appears to measure some aspects of verbal functioning among deaf adolescents, inquiries should be made as to the relationship between verbal functioning and social inference skills.

Summary

This study was an attempt to investigate the use of instrumentation with deaf adolescents, which has proven reliable and valid in the assessment of social inference skills with the mentally retarded population. The Test of Social Inference [Edmonson et al., 1974] was administered to fifty-six non-residential and forty-two residential students, ranging in age from thirteen to twenty-one years, with an average hearing threshold across the speech range below 60 dB (ANSI, 1969) in the better ear. Major adaptations were
made in the administration procedures, using sign language and written modes of communication in addition to auditory and oral modalities. Adaptations were also made in the recording and scoring procedures.

Considering the major adaptations made in the test, internal reliability and validity approached acceptable levels. Concurrent validity of the test was measured through correlations with teacher ratings of students' social behavior adequacy. These correlations failed to reach statistically significant ($p < .05$) levels of meaningfulness, thus the validity of the *Test of Social Inference* as a measure of social inference skill remains questionable. Differences between male and female, as well as residential and non-residential, test performance means were examined. No statistically significant differences were found between group means. Findings did indicate that performance I.Q. scores were statistically significantly ($p < .001$) related to *Test of Social Inference* scores. Thus, the *Test of Social Inference* may serve as a viable tool in the assessment of verbal functioning and as an auxiliary measure to the performance based I.Q. scores traditionally used with deaf subjects.
BEHAVIOR RATING SCALE

Please indicate your relationship to the student:
Teacher_________ Dormitory Supervisor___________
Counselor_______ Other (please specify)___________

Directions:
1. Read the criteria to be used in evaluating pupil performance.
2. Evaluate the student indicated above with respect to criterion.
3. Circle the descriptor that most nearly portrays the student's behavior.
## SOCIAL ADEQUACY CRITERIA AND RATING CATEGORY DESCRIPTIONS
### OF TEACHER BEHAVIOR RATING SCALES

### Social Range:
At ease in diverse situations: participant in a broad array of situations.

<table>
<thead>
<tr>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never at ease; restricted; &quot;shrunk&quot; resists any change</td>
<td>Timid or hesitant about new situations</td>
<td>Tolerates a fair range, is not afraid to try some new activities</td>
<td>Comfortable in many situations. Tries out new activities</td>
<td>At ease anywhere, broad activities</td>
</tr>
</tbody>
</table>

### Social Relationship:
The ability to get fraternize, integrate, converse with peers.

<table>
<thead>
<tr>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has problems with most, while not having close relationship with any peer</td>
<td>Mixes well with select few; has open conflict with some; keeps to self</td>
<td>Self sufficient; not often friendly; not often uncomfortable</td>
<td>Generally friendly; initiates some friendly acts</td>
<td>Mixes well with whole group</td>
</tr>
</tbody>
</table>

### Peer Acceptance:
Is accepted, integrated, included in conversations and social activities. Is sought out and liked.

<table>
<thead>
<tr>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is rejected by almost everyone</td>
<td>Ignored by most. Maybe tolerated or included in very limited activities</td>
<td>Has some acceptance by a few peers. Included in limited activities</td>
<td>Liked by most peers</td>
<td>Liked and sought by almost everyone. Center of most activities</td>
</tr>
</tbody>
</table>

### Social Invisibility:
Quality of social behavior enabling subject to fit into situations acceptably.

<table>
<thead>
<tr>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior always conspicuously inappropriate, unattractive, or discourteous</td>
<td>Often socially conspicuous by inappropriate or discourteous behavior</td>
<td>Some Noticeable mannerisms or behaviors, but generally appropriate. At time conspicuous</td>
<td>Usually well mannered and appropriately behaving</td>
<td>Blends in with groups and activities smoothly. Behavior entirely appropriate and mannered</td>
</tr>
</tbody>
</table>
### CRITERIA AND RATING CATEGORY DESCRIPTION FOR ADDITIONAL TEACHER BEHAVIOR RATING SCALES (T-BR)

#### Appearance:
Shoes tied, clothing neatly arranged, hair groomed, cleanliness of person and clothing, appropriate clothing, proper make-up (girls), clean shaven (boys).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below average</td>
<td>Average</td>
<td>Above average</td>
<td></td>
<td>on most criteria</td>
<td></td>
</tr>
<tr>
<td>on most</td>
<td>on one or more criteria</td>
<td>on one or more criteria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>criteria</td>
<td>more criteria</td>
<td>more criteria</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Industry:
Ability of student to stay with assigned task: to work with a minimum of conversation, wandering and wasting time. Works spontaneously, with enthusiasm and initiative. Completes tasks.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wastes a great deal of time wandering about, usually engages in conversation</td>
<td>Wastes time, frequently wanders about, engages in conversation</td>
<td>Wastes little time. Performs tasks with some interest.</td>
<td>Cooperative, shows willingness and industry</td>
<td>Assumes responsibility for completion of tasks. Initiative and interest</td>
<td></td>
</tr>
</tbody>
</table>

#### Calmness:
Emotional control; ability to accept changes in situation without becoming upset; being able to take directions, suggestions, reprimands without losing temper or showing emotional outbursts.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generally out of control in tense mood</td>
<td>Loses control very easily</td>
<td>Generally shows calm attitude to situation</td>
<td>Calm in most situations</td>
<td>Calm in all situations</td>
<td></td>
</tr>
</tbody>
</table>

#### Academic Skill:
Quality of production. Work is done in an acceptable manner.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Very Poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workmanship very poor. Has to be done over often</td>
<td>Will at times do a fair job. Usually sloppy and needs coaching</td>
<td>Work sometimes needs re-doing</td>
<td>Does a good job most of the time</td>
<td>Almost always does good work</td>
<td></td>
</tr>
</tbody>
</table>

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1. These scale criteria are from Parnicky and Kahn [1963].
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