To the Graduate Council:

I am submitting herewith a dissertation written by Steven Ray entitled "An Adaptation of the 'Wechsler Intelligence Scales (Performance) for Children-Revised' for the Deaf." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Educational Psychology and Guidance.

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AN ADAPTATION OF THE "WECHSLER INTELLIGENCE SCALES (PERFORMANCE) FOR CHILDREN-REVISED" FOR THE DEAF

A Dissertation

Presented for the

Doctor of Education

Degree

The University of Tennessee, Knoxville

Steven Ray

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ABSTRACT

The intellectual assessment of hearing impaired children typically includes administration modifications of the WISC-R. Presently, modifications are left to the individual psychologists, making the reliability and validity of these idiosyncratic alterations open to question. This study developed and assessed the impact of a standardized procedure upon the WISC-R Performance Scales used with the deaf.

With the development of a standardized procedure for administering the WISC-R to deaf children, this study attempted to provide evidence related to two theoretical positions. One position views the deaf as intellectually normal, the other as cognitively different. The most contemporary orientations within the cognitively different position are the Myklebustian Organismic Shift Hypothesis and the Experiential Deficits Theory. The Organismic Shift Hypothesis and Experiential Deficits Theory are explanatory constructs which seek to explain the presumed cognitive differences between deaf and hearing children. The former attributes these differences directly to a sensory loss whereas the latter attributes differences to experiential deprivation induced by the sensory loss.

Approximately 130 protocols resulting from the use of "An Adaptation of the 'Wechsler Intelligence Scales for Children-Revised' for the Deaf" were analyzed. These protocols were submitted by approximately 23 psychologists representing over 20 states. The psychologists tested prelingually deaf (70db loss) children who had no other physical handicaps. The protocols were analyzed to determine if the subtest scores as well as the overall performance IQ differed significantly from the scores obtained by hearing children on the Wechsler standardization.

The general findings provide evidence that the deaf child's scores on the WISC-R do not differ significantly ($p<.01$) from that of the Wechsler norms for hearing children. A peculiar subtest profile was detected and found to be significant ($p<.05$). Analysis of the data suggests that this profile can best be explained by the Experiential Deficits hypothesis. Suggestions were made that future investigations should center around assessing the intelligence of deaf children of deaf parents, since this population showed a significantly higher overall IQ and no peculiarities of profile.

TABLE OF CONTENTS

LIST OF TABLES

TABLE PAGE

LIST OF FIGURES

CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

Certain ethical, methodological, and legal considerations must be taken into account when assessing any child. Ideally, these three considerations represent a unity, and the conscientious psychologist should respond to them in a unitary manner.

When psychologists fail to adhere to sound ethical and methodological principles, litigation will probably ensue. The Education for All Handicapped Children Act of 1975 reflects the public reaction to such disengagement. Every component of this legislation is a reaction to the failure of psychologists and educators to maintain these principles.

The psychologist is legally and ethically bound to provide responsible and competent services to those who are in need. Responsible and competent psychologists recognize the importance of their decisions and the limitations of their training and instrumentation. Misrepresentation of their qualifications jeopardizes the welfare of those served as well as the status of psychologists as a whole.

A recent survey of 172 psychologists working with deaf subjects (Levine, 1974) indicated that only 20% of those

people responsible for psychological evaluation of deaf subjects had specific training related to deafness. Levine's study also noted that the majority of those psychologists reported that their communications skills for working with deaf subjects were less than adequate.

The three most frequently used intelligence tests for the assessment of deaf children were found to be the Wechsler Intelligence Scales for Children (WISC), Performance Scale (Wechsler, 1974), the Leiter International Performance Scale (Leiter, 1948), and the Hiskey-Nebraska Test of Learning Aptitude (Hiskey, 1966). Of the 172 psychologists surveyed, 77% reported using the WISC on a routine basis. The Leiter Scales were reportedly used by 56% of the respondents and the Hiskey-Nebraska by only 31% of the sample. Of these tests, only the Hiskey-Nebraska was developed for and standardized upon deaf children.

The heterogeneity of deaf children can not be over emphasized. Their diverse linguistic performance, various communication systems and high frequency of additional handicapping conditions serve to compound the problems encountered in conducting a proper assessment. Parental hearing status, minority membership and varying socio-economic factors compound even further the complexity of this situation. Developing instrumentation for this population becomes very difficult if each of the above considerations is included.

Legal Aspects of Assessing Deaf Children

There is an estimated 53,000 children enrolled in schools and classes for the deaf in the United States (Craig and Craig, 1975). The Education for All Handicapped Children Act of 1975 (Public Law 94-142) mandates that these children have the right of access to the benefits of a free public education with due process in assessment and placement procedures. As a result, the psychological tests and testing procedures in the evaluation of hearing-impaired children, as well as the services provided by psychologists, come under the purview of Public Law 94-142.

Public Law 94-142 also states that testing must be non-discriminatory. Materials and procedures utilized for the evaluation and placement of handicapped children must be selected and administered in a manner that is neither culturally nor racially discriminatory (Section 612). It is further specified that these materials and procedures must be administered in the child's native language or mode of communication.

Subsequent specification of native language has been outlined in the case of a hearing impaired child in which it was determined that communication must be in the forms of sign language or oral communication (Federal Register, 1977). Rules and regulations for the implementation of 94-142 further provide that instrumentation must be

selected and administered so as not to penalize children with impaired manual, sensory or speaking skills. In addition, it is stipulated that these materials be administered in a manner prescribed by their developers and by trained personnel.

Developing A Standardized Procedure

From the previous discussion, it is apparent that a number of factors combine to preclude adequate psycho-educational assessment of deaf or hearing impaired children. The contributing problems fall into these general categories: 1) Limitations of the psychologist's training; 2) Limitations of the instruments used in assessment; 3) Heterogeneity of the deaf population.

The present study represents one contribution toward providing appropriate evaluations of hearing impaired children. The main thrust of this research was directed toward the development of a standardization procedure for the Performance Scales of the Wechsler Intelligence Scales for Children-Revised, and the subsequent assessment of the impact of this procedure upon intelligence test scores. The "Adaptation of the 'Wechsler Intelligence Scales for Children-Revised' for the deaf" (Ray, 1979) was the resulting instrument. Henceforth, this standardized procedure is referred to as the "Adaptation." The entire psycho-educational assessment process was considered in developing this procedure. The procedure reflects psycho-linguistic, psycho-social and psycho-metric considerations.

Theoretical Considerations

Initially, this study sought only to provide evidence relative to one of two major theoretical positions. The first position holds that the deaf are intellectually normal. Though previous research indicated that deaf children were intellectually inferior, this more contemporary formulation (the deaf as intellectually normal) held that these apparent inferiorities were a function of the type of tests used (verbal tests) and/or the inability of the examiner to communicate with their deaf subjects (as with the WISC-R performance scales).

The second position, the deaf as cognitively different, asserts that differences encountered within the intellectual assessment of deaf children do indeed reflect a difference in abilities. This position predicts that deaf children should score differently on intelligence tests though their overall IQ scores should be within the normal range (as compared to the hearing population).

It was between these two major divisions which this study initially sought to discriminate. If the previous position (the deaf as intellectually normal) were correct, then modifications in test administration which enhanced the child's comprehension of the task would negate the differences encountered on the WISC-R performance scales. Thus, it was hypothesized that the use of the Adaptation would yield intelligence scores within the normal range

(as compared to hearing children) regardless of which of the two theoretical positions were correct. If the deaf as intellectually normal position were true, one would not expect intelligence test scores, nor the mean performance on the individual subtests, to differ significantly between the deaf and normal children. However, if the deaf as cognitively different position were true, there should exist a subtest profile characteristic of deaf children, with no overall difference in performance IQ.

The nature of this profile, however, is predictable within two subtheories. Though both of these theories predict the same profile, each offers its own explanation. One theory, exemplified by Myklebust (the Organismic Shift Hypothesis), explains the deaf profile in terms of cognitive restructuring induced by a sensory loss. The opposing view by Levine, for example, explains this profile in terms of differing experiences resulting from deafness.

In order to test these two theories it would be necessary to separate the effects of the sensory and experiential components of deafness. This separation could be affected by controlling for sensory loss while manipulating experiential deficits. Since deaf children of deaf parents are generally considered to be reared within an experientially normal environment, this population would

be representative of children affected only by a sensory loss. On the other hand, a majority of the deaf children of hearing parents are experientially deprived due to their parents reduced ability to communicate with them. The children of hearing parents are affected both sensorially and experientially.

The data within this study contained samples representative of deaf children of deaf parents as well as deaf children of hearing parents. As a result, an ex post facto analysis of these two subgroups was conducted in order to provide evidence supporting one of the two subtheories (Myklebust's versus Levine's view) within the deaf as cognitively different position.

CHAPTER II

REVIEW OF THE LITERATURE

Historical Developments

There have been numerous studies investigation the intellectual abilities of deaf individuals. In reviewing these investigations, it is interesting to note how perceptions of the intelligence of deaf people have evolved over time. In fact, the leaders in this research (Levine, 1960; Myklebust, 1953; Pintner, Eisenson & Stanton, 1941; Pintner & Reamer, 1920; Rosenstein, 1961; Vernon, 1967) tend to fall within recognizable time periods and theoretical orientations. Though these periods, theories and their representative researchers have different orientations, an advanced organizer would serve to clarify the discussion which follows. Figure 1 illustrates these relationships and their differential predictions of intelligence test performance.

The Deaf As Intellectually Inferior. An early work of Pintner (Pintner & Reamer, 1920) included 2,172 children from 26 residential schools for the deaf. Using group mental tests developed for hearing youngsters, it was concluded from this study that deaf children were generally retarded about two years mentally

The Deaf as:	Inferior	Different		Normal
Proponent:	Pintner	Myklebust	Levine	Vernon, Furth, Moores
Explanatory Constructs:	Sensory	Bio-social	Environmental-Developmental	Developmental
Theory:	Inferior	Organismic Shift	Experiential Deficits	Intellectually Normal
Domain Affected:	Cognitively & Perceptually Inferior	Perceptual Substrates & Cognitive Processes	Language Related or Affected Cognitive Processes	Perceptually & Cognitively Normal
Predicted Test Results:	Low IQ	Average Range Deaf Profile	Average Range Deaf Profile	Normal Range Normal Profiel (No)
Subtest Analysis	Low on all subtests	PA, CD: Low OA: High	PA, CD: Low	Normal
Deaf Children of Deaf Parents:	Low Scores	Deaf Profile	Normal Profile	No Profile
Deaf Children of Hearing Parents:	Low Scores	Deaf Profile	Deaf Profile	No Profile

Figure 1. Theoretical Orientations for the Intellectual Functioning of Deaf Children

and five years educationally. Subsequently, Pintner developed his own group test, the Pintner Non-Language Mental Test (Pintner, 1929) and spent more than a decade using it with deaf subjects. Pintner (Pintner, Eisenson & Stanton, 1946) culminated this study of the intellectual abilities of the deaf with the conclusion that, on the average, they were retarded by 10 IQ points. He also stressed that this retardation was rather stable regardless of the type test used (1946, pp. 126-128). Among those tests used were the Draw-A-Man Test (Goodenough, 1926), group performance tests and the Pintner Non-Language Mental Test (Pintner, 1929).

Pintner was one of the first psychologists to investigate systematically the psychological implications of deafness. Pintner's work seemed to support the general consensus that the deaf were intellectually inferior. The origin of this inferiority was attributed to both a sensory deprivation and additional complications associated with, or resulting from those diseases which cause deafness. These complications were presumed to be brain dysfunctions. Though differences in emotional stability were noted in favor of deaf children of deaf parents, no significant differences were noted in intellectual development of children of deaf versus hearing parents. Large numbers of new instruments were developed in the next few years and the perceptions of the deaf as intellectually inferior slowly changed.

The Deaf As Cognitively Different. Myklebust (1953) reviewed the evidence from the time of Pintner and concluded that the deaf were not inferior but different. His hypothesis suggested that deafness did not quantitatively (as measured by IQ points) affect the individual but that it made him/her qualitatively different. This hypothesis has come to be known as the "Organismic Shift Hypothesis" and was built around the idea that the absence of one of the senses caused a shift in cognitive structures. The net effect of this qualitative change was said to cause the deaf to be more "concrete" as compared to the hearing person who was said to be more "abstract." The conclusions of Myklebust were similar to those of Oleron (1950, p. 191) when he stated "...that the deaf show an inferiority in the sphere of abstract thought...due to the close connection normally existing between language and abstract thought."

Myklebust's theory of qualitative differences seems to have its foundation, in part, in the Whorfian Hypothesis (Whorf, 1956) and its empirical foundation in works of Templin (1950) and himself. According to Whorf, thought (conceptualization) is influenced by language. Thus, it would follow that, if an individual's language is different from another's, then so must the thought processes be different or modified. As a consequence, language differences, based upon fundamental perceptual and imagery differences induced by a sensory loss, should

in turn affect the qualitative nature of one's thought processes. Templin's study investigated the reasoning abilities of day school and residential school children with defective hearing and compared them with matched groups of hearing subjects. The purpose of her investigation was to determine to what extent deafness and/or institutionalization affected abstract reasoning. From the samples tested with the Deutsche questions of physical casualty, the Long and Welch Test of Casual Reasoning, the Brody Non-Verbal Abstract Reasoning Test, and the Pintner Non-Language Mental Test, Templin concluded the following: "The hypothesis that restriction of the environment will result in lower scores on the reasoning tests is largely supported for the intrinsic factor of hearing loss, and largely rejected for the extrinsic factor of residence in an institution" (p. 131).

A great deal of Myklebust's (1960) research centered around the Draw-A-Man Test (Goodenough, 1926) which was used to measure intellectual, personality and social development. Myklebust suggested that "...although the intelligence quotients for the...drawings were comparable, there were qualitative differences" (p. 105). He continued by concluding "...that these differences are of importance when considering the mental processes and variations in intellectual functioning, which are associated with deafness" (p. 106).

Although the view of the deaf as concrete is no longer the dominant theoretical orientation, it remains a highly influential force within deaf education and certain aspects of this orientation have yet to be disproven. A contemporary view of Myklebust's biosocial theory is to be found in a recent article (Tomlinson-Keasey & Kelley, 1978) that integrates many new findings from others fields, such as information processing, which tend to support the Organismic Shift Hypothesis. The central issue involved in the Tomlinson-Keasey and Kelley (1978) article is whether weaknesses in academic achievement of deaf children are induced by lack of early symbolization (experiential deficits) or by a cognitive system which is structurally different. The argument for the latter (organismicly different) is based upon an hypothesized hemispherical-lateralization difference and differences in perceptual organization as a result of relying almost exclusively on visual input. Thus, the deaf child is presumed to be processing language in the right hemisphere (or perhaps lacking complete hemispheric specialization), since the input is visual, as opposed to the hearing child who processes language in the left hemisphere, because the input is auditory. Pursuing this logic, one would then conclude that those tests which require higher levels of language symbolization and conceptualization would present problems to the hearing impaired child, regardless of environmental influences.

On the other hand, they would be more proficient on tasks requiring visual processing since these processes are presumed to be localized in the right hemisphere.

Differences in academic achievement or performance on intelligence tests are viewed by Levine (1960) to be a result of experiential deprivation rather than a sensory loss per se. Levine emphasized the importance of early symbolization and language experiences in the intellectual development of deaf children. The "Experiential Deficits Hypothesis" asserts that the intellectual and academic retardation often observed in young deaf children is a result of a lack of experience, including linguistic experience, rather than a cognitive restructuring induced by a sensory loss. Though the net effect of both explanations may be the same, the former (experiential deficits) is more amenable to modification.

More contemporary support for this position can be found in an article by Watts (1979). In this study, deaf, hard of hearing, and hearing children were compared in various processes including conservation-quantitative thinking, horizontality-spatial thinking, and picture arrangement-social thinking. Watts summarized his findings as follows:

> From the tasks used the results have pointed to the fact that the development of deaf children's cognitive abilities is remarkably unaffected by the absence of verbal language. Secondly, valuable support has been given to the idea that if deaf children perform poorly on some intellectual tasks, this performance can be more adequately accounted for by experiential

> than by linguistic deficiency. The suggestion that experiential deficiency more adequately explains performance is supported by the fact that the improvement of the deaf children on the conservation tasks took place without a concomitant improvement in the comprehension and usage of written language (Watts, 1979, p. 55).

As is evident from the above discussion, two separate theoretical formulations are encountered within the general concept of the deaf as cognitively different. The one espoused by Myklebust contends that the deaf are different due to changes in cognitive makeup induced by a sensory loss. The other position, exemplified by Levine, suggests that these differences are due to lack of appropriate experiences, either linguistic or non-linguistic. The significant differences lie in the educational methods employed subsequent to evaluation. Tomlinson-Keasey and Kelly (1978), for example, suggest that curriculum for the deaf should "...increase the focus of visual experiences, visual labels, and visual transformations of information in an effort to maximize the potential of a visually constructed information processing system" (p. 458).

The Deaf As Intellectually Normal. Hans Furth (1966), working from a Piagetian orientation, has demonstrated that deaf children, presumably lacking in any formal communication structure, are still capable of highly sophisticated problem-solving. Furth proports to have found considerable evidence suggesting that the basis

for intellectual development is not to be found in language, but that language develops from intelligence.

With the advent of modern linguistic theories begun by Chomsky in 1957, new views of language and cognition have been formulated. Central to Chomskian theory is the concept of linguistic universals. Chomsky ascribes these universals as being an inherent part of the biological makeup of an individual and thus he assumes that the child is inately predisposed along these lines. Subsequent theories, while also accepting the notion of linguistic universals, ascribe their existence to universals in the organization of perceptual, cognitive, and learning skills as well as the structure of the environment.

From the cross-cultural research of Osgood (Osgood, Suci and Tannenbaum, 1957) and Slobin (1973) one is readily led to the conclusion that there are many similarities across languages and that these similarities result from more general cognitive processes and experiences which are shared by all people. Again support for these conclusions are found within the work of Piaget. Piaget's extensive studies of child development have resulted in the conclusion that language depends more on cognition than cognition depends on language (Piaget, 1962, 1969), at least during the pre-formal operation stages. The relationship between cognition and language, expressed above, was also supported by Premack (1974) working with language acquisition in apes.

The study of child language acquisition by Brown (1973), Bloom and Lahey (1977), Clark and Clark (1977) and others have, in an indirect fashion, added more to our understanding of the deaf. As a result of their work and theoretical orientation, which asserts that cognition preceeds language in the language acquisition process, the field has come to embrace a type of cognitive universality, which yields a type of linguistic universality. Furthermore, the notion of specific language superiority is rejected. The resultant implications are that abstract thought need not be tied to a particular language system, and that similar cognitive growth can and does take place in the absence of mutually shared linguistic development.

As a result of this orientation, research on the intelligence of deaf children has concentrated upon tests which are primarily performative in nature. Rosenstein (1961) reviewed all studies connected with deaf subjects to that date and reported that when linguistic factors are presented within the language experience of the deaf child, no differences could be found between deaf and hearing subjects in conceptual performance. Primary evidence for this position was derived from his own research (Rosenstein, 1961) using a modified Wisconsin Card Sorting Task and a concept attainment and usage test. All tests were presented visually and nonverbally to samples of 60 hearing and 60 deaf children.

The view that deaf children are conceptually and intellectually normal is also shared by Vernon (1967) and Moores (1978). In a review of 31 research studies involving more than 8,000 deaf children from ages 3 to 19, Vernon (1967, p. 330) reported that 13 of the experiments revealed superior mean or median scores to either test norms or control groups. Non-significant differences were found in 7 studies, and 11 studies indicated that the deaf were inferior. These studies were conducted over a period from 1930 to 1966 and involved approximately 16 different performance tests of intelligence. In discussing the intellectual assessment of hearing impaired children, Moores (1978) "...has come to the conclusion that in those cases where the deaf have shown inferior performance, the most parsimonious explanation may be neither lack of language nor experiential deficiency, but rather the very real possibility that the experimenters were unable to communicate effectively with the deaf subjects" (p. 134).

Intellectual Assessment of Deaf Children

Among the three most commonly used tests in the assessment of deaf children (the Performance Scales of the Wechsler Intelligence Scales for Children-Revised, 1974; The Leiter International Performance Scales, 1940; and The Hiskey-Nebraska Test of Learning Aptitude for

Young Deaf Children, 1966), the Wechsler Scales remain the most popular (Levine, 1974).

The WISC-R Performance Scales consist of five subtests (Object Assembly, Picture Completion, Picture Arrangement, Block Design and Coding) and one alternate test (Mazes). Wechsler (1958) claims that performance on the Object Assembly subtest measures the subject's manner of perception, his use of trial and error techniques and it reveals his reaction to mistakes. Picture Completion measures perceptual and conceptual abilities regarding supposedly familiar objects and practical phenomena in the subject's own environment and knowledge. Picture Arrangement measures the subject's perception, comprehension and use of cues related to social, interpersonal and practical situations in his environment and experience. Block design demands visual perception, measures non-verbal abstract problem-solving, and reflects ability to analyze and synthesize. Coding requires the transformation of symbols and thus normal scores would attest to the child's ability to internalize symbols. In spite of the popularity enjoyed by the Wechsler Performance Scales, there remains to date no standardized procedure by which they are to be given to deaf children. As a result, since 1956, a total of at least 14 studies have been conducted involving the Wechsler Performance Scales yielding a somewhat confusing picture of results. Most

of these studies do indicate an atypical test profile (see Table 1); however, the nature of this profile is by no means stable across studies.

According to Myklebust's position, the deaf child would be expected to exhibit an atypical profile of scores among the subtest of the Wechsler Performance Scales. This orientation would suggest that there are underlying cognitive differences induced by deafness which would cause scores to fall outside the range expected by chance alone. If this variation is due to qualitative differences, there should be some predictable pattern of subtest scores. Indeed, at least one subtest, Object Assembly, does appear to remain at or above average within most studies. A trend toward poorer scores for the deaf than for their hearing counterparts on the Coding subtest is also indicated. The remaining subtests vary considerably from one study to the next (Table 1).

The most comprehensive study to date using the WISC-R involved a total of 1,228 subjects in a stratified sample similar to that of the original Wechsler (1974) standardization. In this study, Anderson and Sisco (1977) collected protocols from psychologists in the field and used them to develop a new set of norms standardized on the deaf population. Inherent in this standardization is the assumption that the deaf subject should score differently from normal children. Indeed this standardization did

TABLE 1

PREVIOUS STUDIES OF THE WECHSLER SCALES WITH THE DEAF

Researcher(s)	Test	N	Population	P.C.	P.A.	B.D.	O.A.	C	M	Total
Graham, E. Ellis and Shapiro, Ester, 1953	WISC	20	Pre-lingual deaf(60db) 6-12 yrs.	0	-	0	+	-	0	-
Goetzinger, C. P. and Rousey, C. L. 1957	Wechsler Bellevue (Form II)	101	Pre-lingual deaf(70db) 14-21 yrs.	-	0	0	+	0		0
Evans, L., 1966	WISC	100	English deaf 6-15 yrs.	+	-	+	0	-		0
Myklebust, Helmer R., 1960	WAIS	11	Pre-lingual deaf 14-15 yrs.	-	+	-	0	-		-
		16	Pre-lingual deaf 15-16 yrs.	0	0	0	+	-		-
		11	Pre-lingual deaf 16-17 yrs.	+	+	0	0	-		0
Neyhus, A., 1962	WAIS	?	Deaf Adults	0	0	+	0	+		+
Lavos, George, 1962	WISC	59	Pre-lingual deaf(65db) 12 yrs.	-	-	-	+	-	-	0
Evans, Lionel, 1966	WISC	100	Deaf and hard of hearing 6-15 yrs.	+	-	+	0	-		0
Hirshoren, A., Hurley, O. L., and Hunt, J. T., 1974	WISC-R	59	Pre-lingual deaf 8-13 yrs.	0	-	0	+	-	0	-

TABLE 1 (continued)

Researcher(s)	Test	N	Population	P.C.	P.A.	B.D.	O.A.	C	M	Total
Vonderhaar, W. F., and Chambers, J. F., 1975	WISC	55	Deaf adoles- 15-19 yrs.	-	0	0	+	0	0	0
Vonderharr, W. F.	WISC	73	Deaf 10-15 yrs.	0	-	+	+	0		0
	WISC-R	73	Deaf 10-15 yrs.	-	-	+	-	-		-
Anderson, R. J., and Sisco, F. H., 1977	WISC-R	1228	Deaf 17 yrs.	0	-	0	+	-	0	-
Sullivan, P. M., 1978	WISC-R		Normal multi-hand. deaf children	-	-	0	0	-	-	
Hess, D. Wilson 1969				+	-	+	+	-		0
Levine, E. S., 1956	Wech- sler Belle- vue (Form II)	31		-	0	0	+	0	0	0

Note: Direction of differences between deaf means and the Wechsler sample. Not all differences were reported as significant.

+ Above the hearing mean
- Below the hearing mean
0 Equal to the hearing mean

indicate that deaf children, as compared to hearing children sampled in the WISC-R norms, have difficulty on at least two subtests, Picture Arrangement and Coding, and show an obvious strength on the Object Assembly subtest. Unfortunately, due to the number of subjects' involved in this study (1228), differences between all subtests proved to be significant. A visual inspection of the results does indicate weaknesses in two subtests (Picture Arrangement and Coding) which would probably remain significant with more modest sample sizes (see Figure 2).

From the data collected in the Anderson and Sisco study new norms were established for deaf children using the WISC-R Performance Scales. In the development of these norms the mean WISC-R performance IQ was found to be 95.7 (S.D. of 17.55) as compared to the Wechsler (WISC-R) mean performance IQ of 100 (S.D. of 15). The net effect of standardizing the norms for deaf children was to allow them an average of 4.3 points on the total performance scale.

An unfortunate aspect of this study is that the method of administering the WISC-R is left undefined (other than the mode of communication). One can not assume uniformity of presentation with a heterogeneous population of deaf children assessed by different psychologists using a procedure developed for hearing

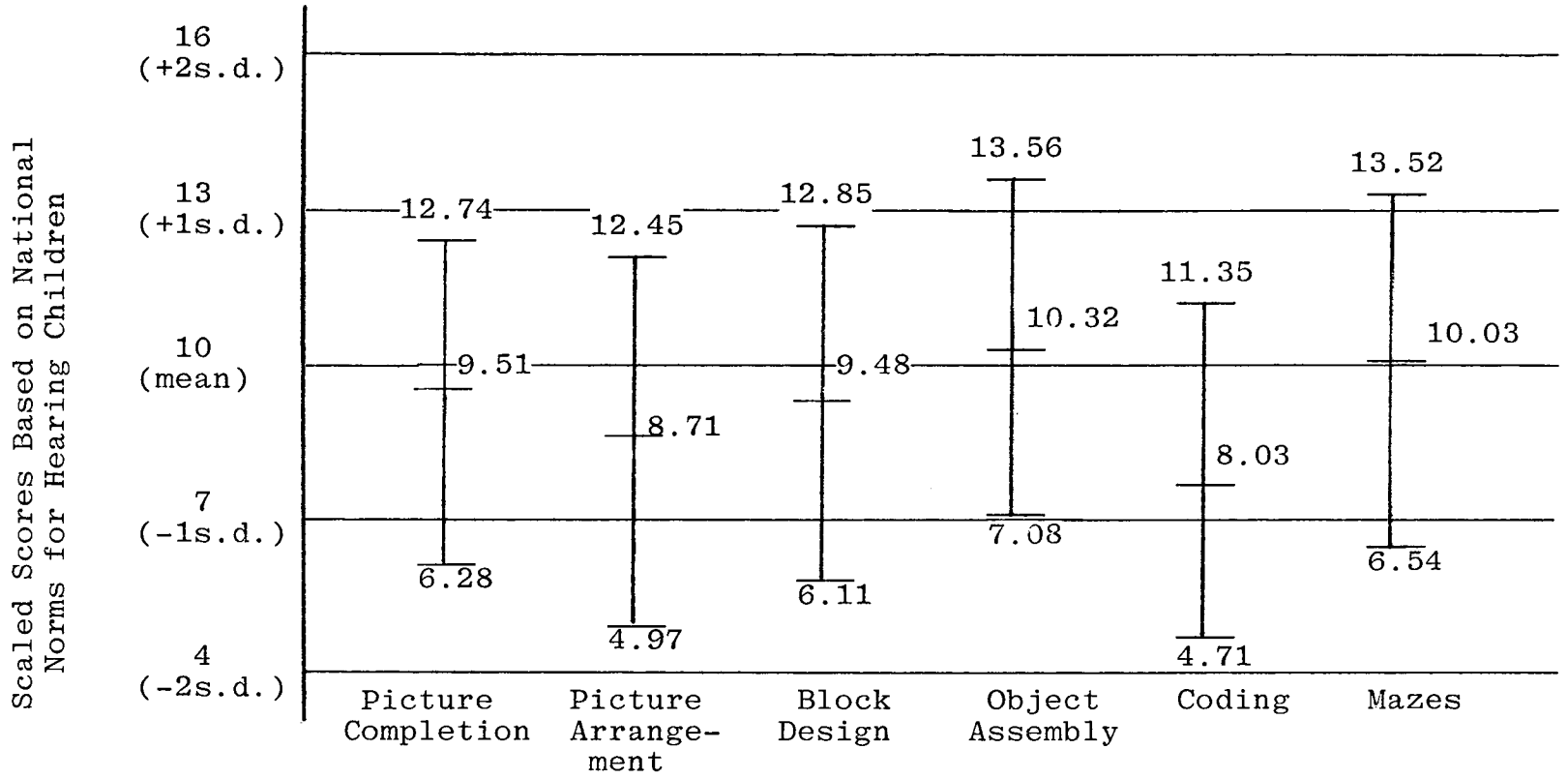

Figure 2. Scaled Score Distribution for Deaf Sample, by Reference to National Norms for Hearing Children: Mean Scaled Score ± One Standard Deviation

Source: Anderson, R. J. and Sisco, F. H. Standardization of the WISC-R Performance Scale for Deaf Children. (Series T, No. 1), Washington, D.C.: Gallaudet College, Office of Demographic Studies, 1977, p. 4, Figure 1.

children. This situation is brought about by the fact that the Wechsler instructions were developed for hearing children and thus simultaneous auditory-visual presentation of stimuli is assumed. This problem is compounded by the limitations of the various manual communication systems. The instructions of the WISC-R contain numerous words for which no predictable or conceptually appropriate sign exists. The following exerpt from the Wechsler manual should serve to illustrate this point.:

> You see, (pointing) some teeth are missing. (Wechsler, 1974, p. 70)

In this sample the child is exposed to a picture of a comb with some teeth broken out. The child is being asked to attend to the picture while simultaneously attending to the visual stimuli of the manual sign or lip movements. In addition, if the child utilized primarily manual communication, the sign for teeth (pointing to the signers teeth with a curved index finger) in conceptually confusing when referring to the tines of a comb. This is only one of many such problems inherent in administering the WISC-R to deaf children.

Theoretical Issues

The deaf as intellectually inferior, is a concept that was unequivicably disproven with the early works of Levine, Myklebust, Vernon and Furth. For that reason no treatment of the topic is given within this study. The main emphasis of this study is the differentiation

of the two other major subdivisions (The Deaf as Cognitively Different and The Deaf as Intellectually Normal) and subsequently the hypothesis encountered within The Deaf as Cognitively Different (The Organismic Shift hypothesis and The Experiential Deficits hypothesis).

Organismic shift hypothesis. If the Wechsler Performance subtests do indeed tap different abilities, then the Organismic Shift Hypothesis would predict that deafness would impose differential effects upon the subtest scores of deaf children as compared to hearing children. With this in mind, an analysis of the processes involved in each subtest and the hypothesized deficits imposed by an organismic shift would suggest a characteristic subtest profile.

The following diagram (Figure 3) from Myklebust (i.e., 1960, p. 225, Figure 15) should serve to illustrate this point:

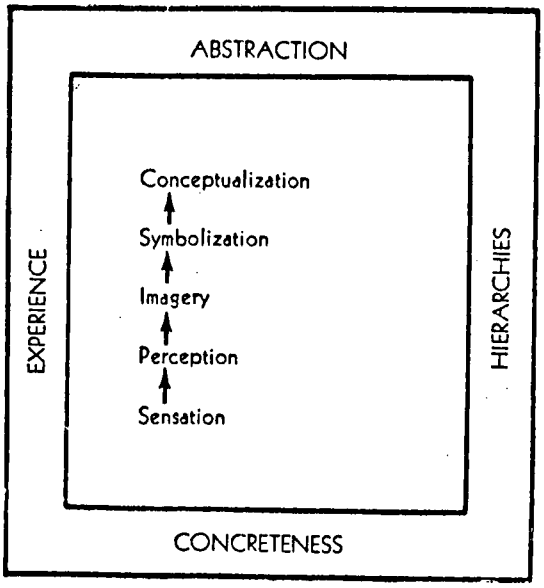

Figure 3. Hierarchies of Experience Ranging from the Concrete to the Abstract

Myklebust (1960) asserts that deafness does not alter the development of the hierarchy of experiences. "However, when auditory sensations are lacking or present only to minimal degree, the nature of [the deaf persons] perceptions, imagery, symbols, and concepts is altered. The levels of symbolization are most affected; development of certain types of abstract behavior is impeded" (p. 229). Thus, one would conclude that those tests which tap the higher levels of experience (Conceptualization & Symbolization) would impose a decrement in test scores of deaf children. Figure 4 compares the subtest of the WISC-R Performance Scales, the process involved in them, and the hierarchies of experience according to Myklebust (from Figure 3).

Experience Hierarchies	PC	PA	BD	OA	CD
Conceptualization		X			
Symbolization		X			X
Imagery	X	X			X
Perception	X	X	X	X	X
Sensation	X	X	X	X	X

OA - Object Assembly
PC - Picture Completion
PA - Picture Arrangement
BD - Block Design
CD - Coding

Figure 4. A Proposed Matrix Model Relating the Skills Identified by Wechsler in the WISC-R to the Hierarchy of Experiences as Described by Myklebust

The mean and standard deviation for each of the WISC-R subtests are 10 and 3 respectively. If deaf children are qualitatively different, one would predict that their test scores on Object Assembly and Block Design would be significantly higher than the mean. This prediction is based upon the idea that the experience hierarchies involved in these tasks are those which have been shifted to the foreground due to a hearing impairment. Picture Completion would be only moderately affected, if at all, and one would expect a score near the mean. Finally, one would predict Picture Arrangement and Coding to be significantly below the mean due to the organismic shift imposed by deafness. In a study of visual memory, Blair (1957) found the deaf children to be inferior on memory span tests which involve the mental integration of a series of "discrete yet related units into a meaningful sequence" (p. 260). However, "...when given a learning or memory task on the infra-conceptual level the deaf child is able to achieve as well or better than the hearing child" (p. 261). As can be seen from Figure 2, the Anderson and Sisco (1977) study also supports this prediction. Several of the studies in Table 1 tend to give additional support to this hypothesis.

Experiential deficits hypothesis. The experiential deficits position would predict a similar test profile to that of the previous theoretical position. However, the

characteristic profile would be attributable to a lack of experiences imposed by deafness rather than deafness (sensory loss) itself. This position is defensable considering certain psycho-social factors frequently associated with deafness.

Primary among the deficits associated with deafness is a developmentally delayed linguistic competency. This delay is generally regarded as a result of parents' inability to communicate with their deaf child (Furth, 1973). Approximately 89% of the deaf children are born of hearing parents (Office of Demographic Studies, 1973) and do not receive language training until they are five or six years old. Thus, at a time when the hearing child's language is approximately 90 or 95% fully developed, the deaf child is just beginning to discover language.

As a result of a lack of development in linguistic competence, one would also expect a concurrent developmental lag in cognitive development. A cognitive delay would be anticipated as a function of fewer interactions between the child and his/her caretakers. The dynamics of communication differences between normal children and their parents and handicapped children and their parents has recently been explored. In two separate studies (Gregory, Mogford, Bishop, 1978; Mogford, Gregory and Keay, 1978) have demonstrated how mother-child interaction

is significantly affected by the child's hearing loss. The interactions appear to reflect less linguistic complexity, a greater number of imperatives, a decrement in declaratives and a greater amount of withdrawal from the deaf child (Gregory, Mogford, Bishop, 1978, p. 42).

In view of the above factors, it is not surprising that deaf children do not acquire the skills necessary to function normally on those tasks utilized on many intelligence tests. However, these generalizations are only applicable to the deaf child of hearing parents. One would not expect to encounter these same problems with deaf children of deaf parents, since these children would have an early exposure to language and their parents would be more able to relate to them.

The profile of a deaf child of deaf parents, then, might be expected to resemble that of the hearing child, if the experiential deficits position were adopted. On the other hand, if the organismic shift hypothesis is assumed to be true, one would expect the deaf child of deaf parents to exhibit a characteristic profile, since the profile is supposedly induced by a sensory loss. Again, according to either theory the deaf child of hearing parents would be expected to have a profile on the WISC-R that would suggest a shift in cognitive abilities.

The deaf as intellectually normal. This position would predict no difference in the average scores or subtest profile of deaf children as compared with hearing children. This position is maintained in view of the assumption that deaf children are cognitively normal. If any discrepancies were encountered in subtest scores, these would be attributed to failure to communicate the task.

The primary function of this study was to lend evidence either to the position of the deaf as intellectually normal or the deaf as cognitively different. Evidence for either of these positions was sought by way of controlling for task communication variables. The primary function of the Adaptation contained herein was to minimize communication problems which might affect the deaf child's performance on the performance section of the WISC-R. Removal of a significant difference between the subtest and total performance IQ scores for deaf versus hearing children was deemed to be evidence that the deaf were intellectually normal. On the other hand, if a characteristic subtest profile were to be encountered, it was to be interpreted as lending support to one of the two remaining conceptualizations (the bio-social or the experiential deficits position).

Upon receiving the data, however, an ex post facto analysis was conducted in order to further discriminate between the various theories. Specifically, the scores

of deaf children of deaf parents were compared to scores of deaf children of hearing parents to shed additional light on the two positions within the deaf as cognitively different orientation.

Differential predictions. The following is a summary of the differential predictions derived from the theoretical positions as they are interpreted within this study.

Utilizing the Adaptation with a representative sample of deaf children will yield appropriate assessments in which:

1. The Deaf as Intellectually Normal - the overall Performance IQ as well as the individual subtest scores will not deviate significantly from the norms for hearing children. In addition, there will exist no significant variation among subtest scores.
2. The Deaf as Cognitively Different - the overall Performance IQ will not deviate significantly from the hearing norms, however, certain subtest might vary significantly from the mean for hearing children. Variations within subtests will reach significance. A comparison of two subgroups of deaf children, one with hearing parents and the other with deaf parents, will yield the following patterns:

a. Organismic Shift Hypothesis - Deaf children with deaf parents and deaf children with hearing parents will exhibit a significant subtest profile, but a similar profile. In this profile, subjects will score significantly higher on the Object Assembly and Block Design subtests than on the Picture Completion, Picture Arrangement and Coding subtests in that order.

b. Experiential Deficits Hypothesis - Deaf children with deaf parents and deaf children with hearing parents will exhibit dissimilar profiles. Deaf children of deaf parents will have no significant subtest variation (ANOVA). However, deaf children of hearing parents will score similarly the predictions of the Organismic Shift Hypothesis.

CHAPTER III

METHOD

Subjects and Sampling Procedure

The appropriate sample size was calculated relative to the assumption that the Performance IQ for deaf children was at least 95 (from previous research) and probably not more than 100 (the norm for hearing children). Composite confidence intervals were then established between these two intervals and the α and β risks were calculated at the 99% levelas follows:

$$95 + 1.96\left(\frac{15}{\sqrt{n}}\right) = \bar{x}_1$$ {Present IQ 95 at .01 level assuming an S.D. of 15}

$$-100 + 1.96\left(\frac{15}{\sqrt{n}}\right) = \bar{x}_2$$ {Predicted IQ 100 at .01 level assuming an S.D. of 15}

$$-5 + 3.92\left(\frac{15}{\sqrt{n}}\right) = 0$$

Solving for n: n=138

Under the null hypothesis, the appropriate sample size was calculated to be approximately equal to 138.[1]

Approximately thirty psychologists, who work primarily with deaf students, were contacted and asked to help in this study. Of the thirty contacted, twenty-three psychologists agreed to participate and returned a total of 127

[1]Lasater, H. A. Personal communication.

protocols. The psychologists were informed as to the nature of the experiment as it related to the development of a standardized procedure and assessing its effectiveness. No detailed information was discussed relative to subtest analysis.

The "Adaptation of the 'Wechsler Intelligence Scales for Children-Revised' for the Deaf" (Ray, 1979) was sent to the 23 psychologists representing 20 states. These psychologists administered the test to at least five subjects and returned the protocols for analysis. The subjects were chosen according to the following criteria: 1) Prelingually deaf (congenital or exogenous) with a minimum of 70db pure tone average loss in the best ear; 2) No other obvious handicap with the exception of corrected vision; 3) Age appropriate for the WISC-R; 4) Only routine or preliminary evaluations were to be included. The latter criterion was deemed necessary to reduce the possibility of a biased sample which might occur if referrals were included.

In order to assure that the treatment was indeed utilized, at least one of the five tests given by each psychologist was observed by another person. Each observer was provided with a copy of the manual and an observation form which was completed and returned along with the protocols (see Appendix B). Upon completion of the prescribed number of evaluation, the psychologist

completed a questionnaire relative to the Adaptation. This questionnaire was designed to explore the perceived usefulness of the Adaptation and its quality.

All forms, as well as a copy of the Adaptation, utilized in this experiment are to be found in Appendix A. On the forms provided, the psychologists were to report demographic information designed to assess the extent to which the experimental group matched those of the Wechsler (1974) sample and the Anderson and Sisco (1977) study. Scores resulting from the use of the Adaptation were reported for each individual subject and, when available, previous WISC or WISC-R scores were included.

Instrumentation: The "Adaptation"

The following is a brief description of "An Adaptation of the 'Wechsler Intelligence Scales for Children-Revised' for the Deaf" (Ray, 1979). The Adaptation represents over one year of development, testing and consultation with over 25 teachers, psychologists and educators of the deaf. The Adaptation contains a manual (with Supplemental and Alternate instructions) and supplemental items for each of the performance subtests. The supplemental instructions and items were designed to communicate the task of each subtest by means of unscored examples similar in nature to the regular Wechsler items. For example, on the Picture Completion subtest, four additional samples have been drawn on paper. The first of these items was

to be completed (drawn) by the examiner, and the remaining three were either drawn or indicated by the subjects. The exact script for these instructions were contained in the Supplemental Instructions.

After the subject completed the supplemental items, the Wechsler items were to be given using the Alternate Instructions. The Alternate Instructions followed very closely the instructions prescribed by Wechsler except they had been linguistically lowered. Linguistically lowering implies that certain lexical and syntactic constructions encountered within the Wechsler instructions had been reduced to a more comprehensible level. The relative complexity of a sentence can be predicted by transformational-generative grammar. A hierarchy of linguistic structures, transformations and consequently sentence types, has been posed by several writers (Bloom and Lahey, 1977; Kretschmer, Kretschmer and Streng, 1977; Russell, Quigley and Powers, 1976). Following these hierarchies, many of the sentences in the Wechsler Instructions were translated into less complex sentences and labeled Alternate Instructions. Additionally, some vocabulary alterations were necessitated due to the limitations imposed by manual communication systems and the significantly restricted vocabulary of deaf children.

Additional modifications of the Wechsler Instructions were imposed due to their simultaneous auditory and visual

presentation. Since the deaf child can attend to only one visual stimulus at a time, modifications of certain procedures were necessary. For example, in the Picture Arrangement subtest, the psychologist is to give the instructions while placing the cards before the subject. Careful planning was required in order to assure the deaf children were given neither greater nor lesser exposure to the stimulus items.

The inclusion of both the Supplemental Instructions and Alternate Instructions was deemed necessary due to the heterogeneity (in terms of linguistic competence) of the deaf population and the necessity for standardization of procedure. The Adaptation in no way modified the items or scoring of the WISC-R Performance Scale. The most important feature of this adaptation is that it allowed the instructions to remain constant across subjects, regardless of the child's linguistic performance, without sacrificing comprehension. A preliminary investigation, in which hearing children were administered the test using only sign language, indicated that the sample items communicated the intent of the test regardless of the psychologist's or child's linguistic performance level.

Statistical Procedures

At least two previous studies (Anderson and Sisco, 1977; Graham and Shapiro, 1953) have estimated the performance IQ of deaf children, on the Wechsler Intelligence

Scales for Children-Revised (1974), to be 95. The present study is based on the premise that a more accurate assessment using "An Adaptation of the 'Wechsler Intelligence Scales for Children-Revised' for the Deaf" would yield an approximate IQ of 100. Likewise, the individual subtests of the Performance Scales should yield approximate means of 10 and standard deviations of 3 when the Adaptation is utilized in the assessment procedure.

Since the one objective of this study was to ascertain if a difference existed between the mean Performance IQ of hearing and deaf children, a *t*-test was the statistic of choide. The *t*-test utilized herein compared the sample mean (of deaf children) with that of the Wechsler (1974) sample. In order to detect the presence of differences in subtest scores, *t*-values were also calculated for each subtest mean and the comparable Wechsler mean. Each of these calculated *t*-scores were evaluated at the .01 level of significance.

Another objective of this study was to determine if a peculiar deaf profile existed within the subtest scores when utilizing the Adaptation. A one-factor repeated measures design (nonadditive model) was employed to detect this profile (Myers, 1976). In this analysis the subjects were treated as the random effects variable and the treatments (subtests) the fixed effects variable. This test yields an F-ratio which would indicate the

presence of a significant difference between the means of the subtest scores. Additional post-hoc comparisons (Scheffe, 1959) were conducted when significant F-ratios were encountered.

Absolute frequencies were tabulated and relative frequencies (percentages) calculated for the demographic data reported on the protocols. These data were gathered in order to ascertain the degree of representativeness of the sample in comparison to the Anderson and Sisco (1977) as well as the Wechsler (1974) sample.

CHAPTER IV

RESULTS

Demographics of the Sample

In order to compare the scores of deaf children with that which would be expected of normal children, the sample of hearing impaired youngsters must be comparable to the Wechsler (1974) sample (WISC-R). These comparisons are graphically presented in Tables 2 and 3. For additional comparison, the characteristics of the Anderson and Sisco (1977) sample (Deaf WISC-R) are also included (Tables 4 and 5).

Though no concerted effort was made to load equally the specific age categories (see Table 2), it is apparent that each of the age groups was adequately represented. Likewise, the distribution of subjects by race, sex, urban-rural residence, and parental occupation was remarkably similar across the Adaptation and WISC-R samples (see Table 3).

The greatest disparity encountered in the comparisons of demographic characteristics is to be found within the geographic region category. Though two regions (Northeast and North Central) are somewhat disproportionate, their pooled percentages permit the argument that this category is also well represented. The pooling of the Northeast

TABLE 2

COMPARISON OF THE AGE DISTRIBUTION OF THE WECHSLER, DEAF WISC-R AND ADAPTATION SAMPLE

Age Group	Number/% of Deaf Subjects		Number/% of Hearing Subjects
	Adaptation	Deaf-WISC	WISC-R
6.5	5/4.7 %	53/4.3%	200/9.1%
7.5	10/7.9 %	69/5.7%	200/9.1%
8.5	9/7.1 %	84/6.9%	200/9.1%
9.5	14/11.8%	79/6.5%	200/9.1%
10.5	10/8.7 %	196/16.1%	200/9.1%
11.5	16/12.6%	181/14.8%	200/9.1%
12.5	9/7.1 %	125/10.2%	200/9.1%
13.5	12/10.2%	113/9.2%	200/9.1%
14.5	24/18.9%	129/10.6%	200/9.1%
15.5	8/7.1 %	121/9/9%	200/9.1%
16.5	4/3.9 %	73/6.0%	200/9.1%

TABLE 3

COMPARISON OF THE DISTRIBUTION BY SEX, RACE, RESIDENCE, GEOGRAPHIC REGION, AND PARENTAL OCCUPATION ON THE WECHSLER, DEAF WISC-R AND ADAPTATION SAMPLE

	Adaptation	Deaf WISC-R	WISC-R
Sex			
Male	53.5%	56.0%	50.0%
Female	46.5%	44.0%	50.0%
Race			
White	81.9%	78.1%	85 %
Non-White	18.1%	20.8%	15 %
Unreported		1.1%	
Residence			
Rural	24.4%	16.4%	29.2%
Urban	75.6%	82.5%	70.8%
Unreported		1.1%	
Geographic Region			
Northeast	44.1%	19.9%	21.8%
North Central	3.9%	33.8%	29.1%
South	32.3%	20.2%	31.6%
West	19.7%	24.8%	17.5%
Unreported		1.3%	
Parental Occupation			
Professional	19.8%	14.5%	15.0%
Managers	24.8%	18.9%	27.0%
Craftsman	15.7%	16.7%	22.6%
Operatives	22.3%	29.3%	29.0%
Laborers	17.4%	12.4%	6.4%
Other		8.2%	

TABLE 4

HEARING STATUS OF PARENTS:
NUMBER/PERCENT

	Adaptation	Deaf WISC-R
Both Hearing	104/86%	1,110/89.6%
Both Deaf	15/12.4%	100/8.1%
One Hearing, One Deaf	1/.8%	6/.5%
Not Reported	1/.8%	22/1.8%

TABLE 5

METHOD OF COMMUNICATION USED IN TEST ADMINISTRATION

	Adaptation	Deaf WISC-R
Total Communication	91.7%	77.2%
Oral (Speech Only)	7.4%	2.2%
Fingerspelling w/Speech	.8%	4.4%
Gestures	NA	1.3%
Pantomime	NA	7.3%
Other	NA	6.6%
Not Reported	NA	1.0%

region and the North Central region is logically justifiable since the inter-regional variation is probably less important than the remaining two (South and West). Thus, the pooling of the Northeast and North Central regions yield a percentage of 48.0 which is comparable to the respective combined percentage of 50.9 in the Wechsler sample. The regions categorized as South and West yielded percentages of 32.3 and 19.7, respectively; whereas, Wechsler (1974) indicated 31.6% and 17.5% in these areas.

The potentially important category of parental occupation was again well distributed (see Table 3). This factor is deemed significant since it probably best reflects socio-economic income level, which is frequently associated with differing levels of achievement.

On those characteristics which are peculiar to the hearing impaired population, a summary of the sample characteristics of the Adaptation and the Deaf WISC-R are made for comparative purposes (see Tables 4 and 5). The major discrepancies are to be found within the methods of communication used. In this study 91.7% of the tests were administered using Total Communication (TC), whereas Total Communication was the mode in 77.2% of the Deaf WISC-R study (1974). Three potential factors contribute to this difference: 1) A heavier sampling (in the present study) of the Northeast geographic region resulted in a higher percentage of oral students (7.4%) than was found

in the Deaf WISC-R sample (2.2%); 2) Changes in methods of communication in favor of TC have probably occurred in the past two years; 3) The remaining three categories (Gestures, Pantomime and Other) were precluded by the procedural standardization germane to the Adaptation.

In general, the demographic data relative to the present study closely approximate those components of the WISC-R sample, where they are relevant, and also the Deaf WISC-R, when appropriate. The similarity of these demograhics add to the generalizability of the forthcoming findings, as well as augment the comparison between the present study and previous studies of the WISC-R.

Statistical Results

The summary statistics representative of the 127 protocols are presented in Table 6. A t-test was performed on the overall Performance IQ (PIA) to determine if the scores obtained differed significantly ($p<.01$) from that which would be expected for hearing children (Table 7). The mean PIQ resulting from the Adaptation was found to be 99.25 with a standard deviation (S.D.) of 19.35, as compared with the Wechsler norms which have a mean of 100 (S.D. 15). The calculated -value for this score ($t=-.44$, $p>.50$) indicates that the means of deaf children probably do not differ from hearing children on the overall Performance IQ.

TABLE 6

A COMPARISON OF THE MEANS AND STANDARD DEVIATION OF SCORES OBTAINED USING THE ADAPTATION WITH THOSE OF THE ANDERSON AND SISCO STUDY

	Adaptation N=127	Anderson & Sisco N=1220
PC	9.90 (3.22)	9.51 (3.23)
PA	9.28 (3.85)	8.71 (3.74)
BD	9.81 (3.48)	9.48 (3.37)
OA	10.71 (3.43)	10.32 (3.24)
CD	9.32 (3.46)	8.03 (3.32)
PIQ	99.25 (19.35)	95.7 (17.55)

TABLE 7

MEANS, STANDARD DEVIATIONS, T-VALUES AND PROBABILITY LEVEL COMPARING SCORES ON THE ADAPTATION WITH HEARING NORMS

	PC	PA	BD	OA	CD	PIQ
Mean	9.90	9.28	9.81	10.71	9.32	99.25
S.D.	3.22	3.85	3.48	3.43	3.46	19.35
t	-.36	-2.12	-.61	2.33	-2.21	- .44
p	.721	.033	.548	.020	.027	.668

Adaptation N=127

Similarly t-tests were calculated for all subtests comparing them with the Wechsler norms which reflect a mean of 10 and standard deviation of 3. The Picture Completion (PC) and Block Design (BD) subtests yielded means of 9.90 and 9.81 with standard deviations of 3.22 and 3.48 respectively. The remaining three subtests, Picture Arrangement, Coding and Object Assembly deviated somewhat from the mean of hearing children; however, none reached significance beyond the 1% level. Picture Arrangement and Coding were calculated to have means of 9.28 and 9.32 with standard deviations of 3.48 and 3.46 respectively. Though the calculated t's for Picture Arrangement (PA) and Coding (CD) were not significant at the 1% level (t=-2.12 for PA and t=-2.21 for CD) they would be significant had the 5% level been chosen at the onset of the experiment. The same case exists for the Object Assembly (OA), except in the opposite direction, where the mean was found to be 10.71 (S.D.=3.43) and t=2.33 (again not significant at the 1% level).

The number of subjects included in the study, the demographic characteristics of these subjects, and the procedural standardization utilized, argue strongly for the validity of selecting a .01 level of significance. However, the striking similarity, between the profile found herein and that found within the Anderson and Sisco (1977) study, makes it difficult to reject the possibility

that there exists a deaf profile on the WISC-R Performance Scales. This similarity is best illustrated in Figure 5.

In an attempt to gain additional information relative to this finding, an ex post facto analysis of the data was made. In this analysis the subtest scores were subjected to a Repeated Measures ANOVA to determine if a significant difference existed between those means. A nonadditive, mixed model was adopted which assumed the following linear score model:

$$Y_{ij} = \mu + \eta_i + \alpha_j + (\eta\alpha)_{ij} + \varepsilon_{ij}$$

The calculated F-ratio of 7.66 (see Table 8) suggested that the means differed significantly ($p<.001$) across each of the treatments (subtests).

Two separate post-hoc comparisons were made employing the Scheffe technique (Scheffe, 1959). The first included all pair-wise differences between means and indicated that only the comparison of Picture Arrangement vs. Object Assembly contributed to the overall significance of F for total sample (Table 9). Based upon the matrix model presented in Figure 4 (p. 27), a second comparison was concluded in which the means of the combination of Block Design and Object Assembly were compared to each of the remaining subtests. This arrangement, however, failed to demonstrate that such a comparison contributed to the significance of F.

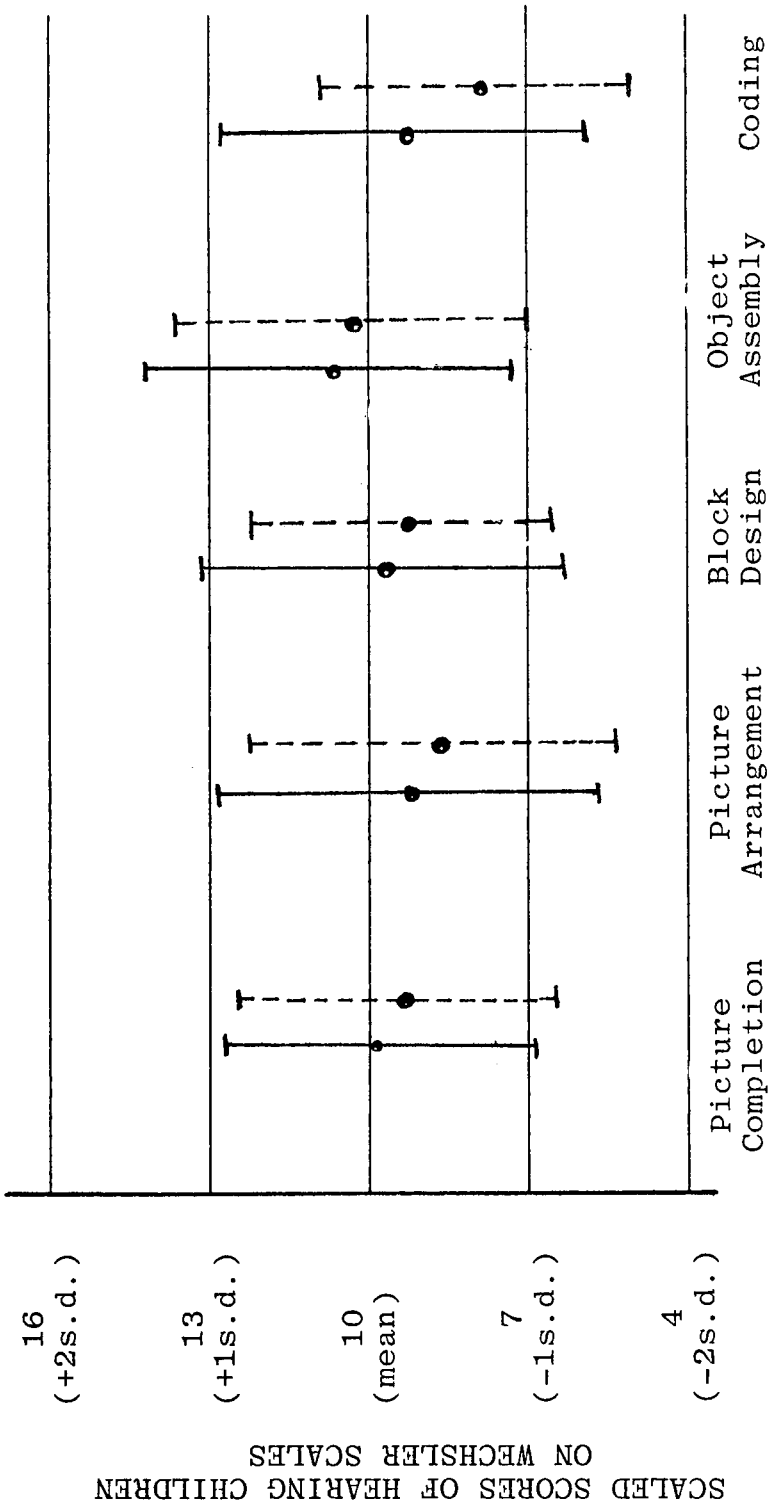

Figure 5. Comparison of Subtest Means and Standard Deviations of the Adaptation (Solid) and the Deaf WISC-R (Dotted).

TABLE 8

TREATMENTS BY SUBJECTS ANOVA FOR
TOTAL SAMPLE (N=127)

Source	df	SS	MS	EMS	F	Probability
Subtests (A)	4	169.92	42.48	$\sigma_e^2+\sigma_{SA}^2+n\theta_A^2$	7.662	.0000
Subjects (S)	126	4885.99		$\sigma_e^2+a\sigma_S^2$		
Residual (SA)	504	2794.48	5.54	$\sigma_e^2+\sigma_{SA}^2$		
Total	634	7850.39				

TABLE 9

RESULTS OF THE SCHEFFE'S TEST (α.01)
ON THE SUBTEST MEANS WITH TOTAL DEAF SAMPLE

Subtest	OA	PC	BD	CD	PA
Mean	10.71	9.90	9.81	9.32	9.28

Previous demographic studies indicate that approximately 12% of the children who are deaf also have deaf parents (Office of Demographic Studies, 1973). Thus, random sampling procedures would be expected to yield approximately sixteen deaf children of deaf parents from the total sample of hearing impaired children in this study. As would be predicted, 16 such children were encountered. These children were chosen to be representative of children who have a sensory loss but who are not experientially deprived. Though deaf children of deaf parents were represented with the appropriate proportions, an inspection of these youngster's PIQ scores indicated an above average mean of 119 (see Table 10). An analysis of their subtest profile (see Table 11) suggested a rather flat profile with no significant subtest variation ($p<.75$). In order to find a similar group of deaf children of hearing parents and at the same time control for IQ level, the remaining children from the sample whose PIQ was 115 and above (1 s.d. or more above the mean) were chosen as a comparison group. Again, this decision was made in order to control for the possibility that the flatness of the profile was a function of higher IQ rather than parental (and therefore experiential) differences. Deaf children of hearing parents (see Table 12) proved to have a very unstable profile ($F=8.78$, $p<.001$). The relative strengths and weakness were characteristic of what has previously

TABLE 10

A COMPARISON OF THE MEANS AND STANDARD DEVIATIONS OF SCORES OBTAINED BY DEAF CHILDREN WITH DEAF PARENTS, DEAF CHILDREN (IQ≥115) OF HEARING PARENTS AND THE TOTAL SAMPLE

		PC	PA	BD	OA	CD	PIQ
Deaf Children of Deaf Parents N=16	$\bar{x}$	12.13	13.38	12.69	12.63	12.69	119.
	S.D.	2.13	2.85	3.38	3.38	3.22	13.07
Deaf Children (IQ 115) of Hearing Parents N=15	$\bar{x}$	13.33	11.53	14.60	15.73	11.93	126.
	S.D.	2.47	1.88	2.32	2.49	2.31	
Total Sample N=127	$\bar{x}$	9.90	9.28	9.81	10.71	9.32	99.25
	S.D.	3.22	3.85	3.48	3.43	3.46	19.35

TABLE 11

TREATMENTS BY SUBJECTS ANOVA FOR PERFORMANCE SUBTESTS OF DEAF CHILDREN OF DEAF PARENTS (N=16)

Source	df	SS	MS	EMS	F	Probability
Subtests(A)	4	12.68	3.17	$\sigma_e^2+\sigma_{SA}^2+n\Theta_A^2$	.479	.753
Subjects (S)	15	207.60		$\sigma_e^2+a\sigma_S^2$		
Residual(SA)	60	396.52	6.61	$\sigma_e^2+\sigma_{SA}^2$		
Total	79	616.80				

TABLE 12

TREATMENTS BY SUBJECTS ANOVA FOR PERFORMANCE SUBTESTS OF DEAF CHILDREN (IQ≥115) OF HEARING PARENTS (N=15)

Source	df	SS	MS	EMS	F	Probability
Subtests(A)	4	187.81	46.95	$\sigma_e^2 + \sigma_{SA}^2 + n\Theta_A^2$	8.78	.0001
Subjects(S)	14	73.15		$\sigma_e^2 + a\sigma_S^2$		
Residual(SA)	56	299.39	5.35	$\sigma_e^2 + \sigma_{SA}^2$		
Total	74	560.35				

been referred to as the deaf profile. Thus, this profile which is predicted within the experiential deficits position, could likely be attributed to experiential factors rather than sensory deprivation alone.

Again, two post-hoc comparisons were conducted in the same manner as indicated with the total sample means. This comparison similarly indicated that only the comparison of the two extreme means (Object Assembly and Picture Arrangement) reached significance at the 1% level (Table 13). The comparison contrasting the logical groupings of the matrix model (Figure 4, p.27) failed to indicate a significant difference.

TABLE 13

RESULTS OF THE SCHEFFE'S TEST (α .01) ON THE SUBTEST MEANS WITH DEAF CHILDREN OF HEARING PARENTS

Subtest	OA	BD	PC	CD	PA
Mean	15.73	14.60	13.33	11.92	11.53

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

Conclusions

The generalizability of these findings is enhanced by the nature of the sample included. It should be noted that, on nearly every demographic variable, this study closely approximated the WISC-R sample. On those characteristics which were peculiar to the deaf population (i.e., hearing status of parents, etc.), this investigation almost exactly duplicated the demographics of the Anderson and Sisco study. In addition, 50% of the psychologists participating in this study also participated in the Anderson and Sisco investigation.

In general, the findings support the idea that deaf children do not differ significantly from hearing children on the WISC-R performance scales. This conclusion holds true for the overall Performance IQ as well as the individual subtest scores using $p < .01$. Thus, it seems that when factors related to test administration (i.e., the child's comprehension of the task) are controlled, deaf children score on the average the same as the normal population.

If the above conclusions are true, then there seems to be little need for separate norms as concluded and developed within the Anderson and Sisco study. Unlike

the Anderson and Sisco study, this investigation utilized a known manner of presentation (the Adpatation) and, thus, controlled for idiosyncratic variations among psychologist's procedures. It could be argued that there still remains a variation in certain subtest scores ($p<.05$ on three subtests). Had a lower α level been chosen, some of the subtests would justifiably require renorming. If one were to reach such a conclusion, then the Adaptation would provide a standardized manner of presentation which would add to the validity of the subsequently developed norms. Failure to adopt a standardized procedure would lead only to a new set of norms of questionable value.

The effects on subtest and overall PIQ scores of the Adaptation could potentially come from one of three sources: 1) Improved comprehension of the task, 2) Practice effects resulting from the supplemental items, 3) Examiner bias. The latter of these (examiner bias) was controlled since 23 different psychologists were involved in the administration, and none were informed as to the theoretical issues involved in the study.

The potential influence of a practice effect can be partially disclaimed on the grounds that the techniques employed are commonly used by most psychologists actively involved in the assessment of deaf children.[2] Since many of these techniques were in common use during the Anderson

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[2]Personal communication with all participating psychologists.

and Sisco study, they did not apparently inflate the scores within it. Though final resolution of this issue must rest on future research, it is generally not considered to be a factor which would inflate test scores.

Thus, improved comprehension of the task remains as the best single explanation of the effects of the Adaptation upon test scores. Future research could focus upon this component by simply administering the adaptation to a group of hearing children (presumably of normal intelligence) and assessing its effects on test scores.

Theoretical Implications

That the deaf are intellectually normal is generally supported by these findings, since neither the subtests scores nor the Performance IQ scores were significantly below that which would be expected of the hearing population. However, the rather obvious subtest profile of these students is difficult to ignore. Also, as mentioned previously, when these scores were subjected to a repeated measures analysis, a significant subtest variation was encountered. The characteristics of this subtest profile are predicted by two separate theories within the orientation which has been labeled as The Deaf as Cognitively Different.

Though the original thrust of this study was only to differentiate between the two major theoretical issues

(The Deaf as Intellectually Normal vs. The Deaf as Cognitively Different), an ex post facto analysis yielded additional information which discriminates between the two remaining orientations (the Myklebustian bio-social position and Levine's experiential deficits position). In order to discriminate between these two orientations, one would of necessity require a population of deaf children who were not experientially deprived, as well as deaf children who were generally considered to be experientially deprived. Two groups of children within this study would potentially meet these criterion. This study included the protocols of sixteen deaf children of deaf parents. The mean scores ($\bar{x}$=119) for these children were substantially above what would be expected of even normal children ($\bar{x}$=100). Since these were higher than expected, and since the profiles which they produced could be a result of high scores, they were compared to a group, similar in size (N=15), of high scoring deaf children of hearing parents ($\bar{x}$=126).

As previously mentioned, deaf children of hearing parents are at a considerable experiential disadvantage since their parents have difficulty communicating with them. Unlike these children, deaf children of deaf parents grow up in a more or less normal environment which is linguistically and experientially rich in nature. The primary difference in these children then is the

experiential differences rather than sensory differences. Isolating the above factors indicated that the profile frequently encountered and labeled as a deaf profile is the result of experiential deficits rather than sensory loss.

A somewhat similar profile has been noted within a sample of 176 culturally different (Appalachian) white children (Vance and Hankins, 1978). "In the Performance tests the Ss scored significantly higher on the Picture Completion and Object Assembly subtests than on the Block Design, Picture Arrangement, and Coding subtest in that order" (p. 18). This profile was attributed to cultural deprivation.

Implications for Future Research

The conspicuous differences in profiles among deaf children of hearing vs. non-hearing parents certainly deserves additional investigation. Since the discovery of these differences was not anticipated, a pre-planned investigation of these two subgroups was not established. The ex post facto nature of this line of inquiry leaves open several sources of internal and external threats to validity.

Future research should seek to compare either matched (for PIQ) or random samples of deaf, children of both hearing and deaf parents. A controlled investigation along the dimensions of parental hearing status would

lend a significant contribution to the resolution of the biosocial-environmental division.

The unusually high PIQ scores ($\bar{x}$=119) encountered within the group of deaf children of deaf parents also warrants further investigation. The questions which remain to be answered are: 1) Do these scores reflect a true superiority of deaf children of non-hearing parents or are they merely an artifact of a biased sampling procedure? 2) If these scores are representative of the population, are they a result of experiential, organismic or procedural factors?

Although answers to these questions await further research, at least one other study has indicated a superiority in Performance IQ for deaf children of deaf parents. Brill (1960) identified 45 deaf children of deaf parents in a residential school with 583 students enrolled and found the mean IQ of these 45 children to be 111.7. Elsewhere, Larr and Cain (1959) reported the WISC IQ scores for a representative sample of students from the same school to be 97.8.

Additional investigation could center around the potential effects that this adaptation would have on the test scores of hearing children. This line of investigation would do much to answer questions of practice effect and other potential threats to the validity of test scores obtained with the Adaptation.

Implications for the Testing of Deaf Children

Gerwick and Yesseldyke (1975) have challenged the use of the WISC-R scales with deaf children on the grounds that no deaf children were included in the standardization and that procedural modifications required for assessing this population violate the underlying assumptions of standardized testing. The standardization of the WISC-R performance scales by Anderson and Sisco was a step in the right direction. This study failed, however, to specify the procedures for administration. A review of fourteen different studies reporting WISC and WISC-R scores (refer to Table 1) seems to indicate that subtest patterns and Performance IQ may be indiosyncratic to individual examiners. These variations attest to the need for procedural standardization.

By providing a standard format of presentation "An Adaptation of the 'Wechsler Intelligence Scales for Children-Revised' for the deaf" is an important step in providing an appropriate and accurate assessment of deaf children's performance IQ. The question of appropriate normative standardization, however, is again brough to bare on the issue. As a preliminary investigation, the present study sought to determine the extent to which new norms would be necessary if the Adaptation were utilized. The results indicated that the Wechsler norms for hearing children were sufficient to provide an adequate assessment under these circumstances. Thus,

until new standardization data can be gathered under known procedural conditions (such as the Adaptation), the Adaptation can serve as a safeguard against an inappropriate assessment. In addition, this test provides a means of comparison between deaf and hearing children.

At present, only one test of intellectual ability meets all the requirements deemed necessary for the appropriate evaluation of deaf children. The Hiskey-Nebraska Test of Learning Aptitude is the only test standardized and developed specifically for deaf children. The Levine (1974) survey, however, reported that the Hiskey-Nebraska Test of Learning Aptitude ranked only third among the most frequently used devices for assessing the intellectual capacity of deaf children. In accounting for the lack of utilization of this test, Levine (1974) speculated that unfamiliarity and the length of time required for administration were probably major factors.

A primary assumption underlying psychological assessment is that "...the subjects being tested have been exposed to comparable but not necessarily identical acculturation" (Newland, 1971, p. 118). One vehicle of acculturation would presumably be language. The opportunity for deaf children to acquire language, and consequently be acculturated, is greatly restricted by a sensory loss. In the majority of the cases, deaf children are not exposed to language until a diagnosis

is made and an appropriate educational program begun. It is not uncommon for this process to be delayed until the child is five or six years of age. By this time, the normal hearing child has virtually mastered language and has had the opportunity to accrue the benefits of acculturation, part of which are transmitted within the linguistic milieu.

Some deaf children, especially those who have deaf parents, do not suffer so dramatically from their sensory impairment. An early exposure to language apparently enhances normal acculturation and intellectual growth. The soci-cultural and linguistic environments are, none-the-less, different. This is especially true of minority deaf children.

It is this heterogeneity of the deaf population which makes it difficult to provide an accurate assessment of the intellectual abilities of deaf children. For this reason, extreme caution must be taken before drawing conclusions from assessments on deaf children. One must be careful to take into account all circumstances related to the nature, degree and age of onset of deafness as well as the environment within which the child lives. Instrumentation, such as the Adaptation or the Hiskey-Nebraska, will never replace good judgement and professional expertise in the assessment procedure, but should aid in obtaining reliable and valid results.

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APPENDICES

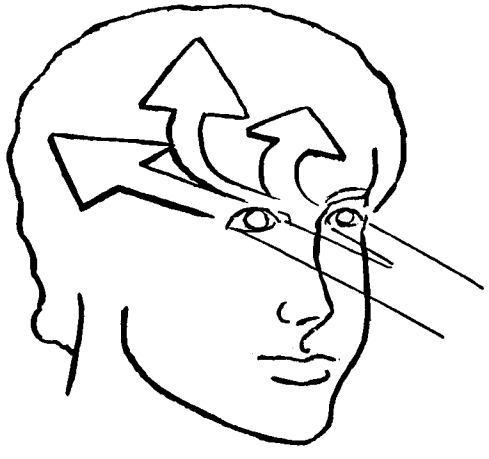
APPENDIX A

AN ADAPTATION OF "THE WECHSLER INTELLIGENCE SCALES FOR CHILDREN-REVISED" FOR THE DEAF

An Adaptation of the

WECHSLER INTELLIGENCE SCALES FOR CHILDREN - REVISED

for the Deaf



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INTRODUCTION

Purpose

This manual is designed to supplement the "Wechsler Intelligence Scales for Children-Revised"[1] (WISC-R) to facilitate the testing of certain handicapped children. It contains alternate and supplemental materials designed to minimize the adverse effects of these handicapping conditions within the testing situation. This adaptation is for the Performance Scales only.

In the past psychologists have found it necessary to improvise adaptations and special instructions in order to arrive at meaningful test scores for the deaf. Though the psychologists repertoire of improvizations may grow with each successive encounter, many questionably valid test scores are generated along the way. It is the purpose of this manual to provide the psychologist with materials and information which will lead to a more thorough and fair test, without trial and error.

While the individual improvizations may have generally met the needs of the immediate test situation, they fail to provide us with a body of meaningful information which can lead to the development of norms. Norms generated from tests which utilize no standard presentation format are of uncertain value, thus reducing generalizability and replicability. However, standardization of format is no easy problem with such a diverse group as that of the hearing impaired population. We encounter such problems as varying modes

of communication (i.e., American Sign Language, cued speech, oral, the Rochester Method, Signing Exact English, etc.) divergent language competencies and dialectual differences - all of which could contribute to a poor score, even within the performance subtests.

Integrity of the Wechsler Scales

At no point has there been any attempt to alter the Performance Scales, but instead the instructions have merely been adapted to the necessary altered communication methods. Some lexical and syntactical features of the existing instructions are extremely complex for the deaf individual. For example: "I am going to show you some pictures in which there is a part missing."[2] This sentence has been altered to read: I will show you some pictures that have a part gone. Even this reduction will frequently be difficult for the average hearing impaired child.

Lexical items have been chosen which are commonly used within the various manual communication systems and which seem to be frequently used within the educational milieu. The vocabulary chosen is the result of careful scrutiny by teachers representing at least 18 states. Lexical items were chosen on the basis of clarity, simplicity, and commonality of signs.

In addition to the linguistic differences of the hearing impaired, the physical handicap itself requires instructional modification. The instructions of the WISC-R assume simultaneous visual and auditory presentation. Obviously this is not passable

for a person with no audition. This problem requires careful planning so as to produce intelligible instructions. Without such planning much confusion can be encountered and certainly no standardization is possible.

All of the above considerations were taken into account in the development of the Alternate Instructions found within this manual. No attempt has been made to change the test items or their scoring procedure. It is also recommended that the Wechsler norms be used when converting the raw scores to standard scores.

Supplemental Instructions

Frequently one encounters the hearing impaired child with very limited expressive and receptive language beyond the gestural level. This subject will gain little from the Alternate Instructions. For this reason a series of Supplemental Instructions have been developed which enable the subject to comprehend the task regardless of their linguistic skills. Though these instructions involve some language they are primarily in the form of examples. The supplemental items have been designed to shape the desired responses and minimize the possibility of a practice effect. Throughout these items, lexical items are introduced so as to increase comprehension within the Alternate Instructions.

No scoring is required within the Supplemental Instructions, but none-the-less they should be followed carefully so as to promote standardization of administration. Again the purpose of this manual

is three-fold: 1) To increase the deaf subjects comprehension of the task; 2) To provide a standardized method of presentation; 3) To provide the examiner possessing limited experience with a manual which will allow assessment of this highly heterogenous population.

Using An Interpreter

The introduction of an interpreter into the testing situation can have positive effects. This is especially true when the psychologists possesses limited manual communication skills. The interpreter, however, can also introduce numerous variables. Many of these variables can be reduced by using a qualified interpreters who is properly briefed as to his/her responsibilities to the client as well as the psychologist.

This manual is also recommended when the aid of an interpreter is to be employed. The instructions should be read by the examiner and the interpreter should sign the instructions exactly as read. In this situation the interpreter should be advised as to the importance of his/her signing the instructions exactly. Before the interpreter begins the test he/she should familiarize himself/herself with the testing materials and Alternate instructions, taking special note of those words which have parenthesis.

All instructions have the word " point " where it is intended that the interpreter and examiner should direct the child's attention to the stimulus objects. After sufficient time the examiner should redirect the subjects eyes to the interpreter, so that instructions may continue.

The interpreter should be seated to the right or left of the examiner and should take care to see that the proper lighting conditions exist. It is recommended that a trained (and if possible certified) interpreter be used.

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[1]Wechsler Intelligence Scale for Children-Revised, New York; The Psychological Corporation, 1974.

[2]Ibid, pg. 70.

TEST 2 PICTURE COMPLETION (SUPPLEMENTAL) OTHER

Place the Picture Completion sample sheet before the student and give him/her a red pencil. You can accept a verbal response but encourage a pointing or drawing response also.

Instructions:	Sample 1.	Say: "WATCH ME." Then draw in the missing arm and hand on the stick figure. Now say: "SEE THE ARM WAS MISSING (GONE) [POINT]. I FINISHED THE PICTURE."
Instructions:	Sample 2.	Giving the subject the red pencil, say: "YOU FINISH THIS PICTURE [POINT]."
Prompts:		If student fails to respond correctly, say: "SOMETHING IS WRONG, SOMETHING IS MISSING. WHAT IMPORTANT PART IS MISSING (GONE)?"
Additional Prompts:		If subject continues not to respond or responds incorrectly, say: "WATCH ME FINISH THE PICTURE." Draw in the missing part.

Additional Instructions:	Using a new picture completion page say: "YOU FINISH THIS PICTURE [POINT]." If subject responds correctly, confirm his/her response and reinforce his/her efforts.
Confirmation:	After completing the picture, say: "RIGHT!! THE EAR WAS MISSING (GONE) [POINT]. THE EAR IS IMPORTANT."
Instructions: Sample 3.	Beginning Sample 3, say: "WHAT IMPORTANT PART IS MISSING HERE [POINT]?"
Prompts:	Pointing to where the stars should be say: "THE STARS ARE MISSING (GONE). YOU DRAW STARS."
Confirmation:	After the subject responds correctly, say: "RIGHT!! THE STARS WERE MISSING (GONE). THE STARS ARE IMPORTANT."
Instructions: Sample 4.	Replace the pencil with the pointer provided in the supplement. Next say: "WHAT IS WRONG IN THIS PICTURE; SOMETHING IS MISSING [POINT TO SAMPLE SPACE 4]."

Prompts:	If child responds incorrectly say: "No." Or if subject fails to respond say: "See, the important part is this [pointing to where the finger should be]. You finish the picture."
Confirmation:	If the subject responds correctly say: "Right!! The finger was missing. The finger is important."

TEST 2 PICTURE COMPLETION (ALTERNATE) OTHER

During this portion of the test the procedure is essentially the same as indicated by the Wechsler manual. It will probably be helpful to continue using the pointer, especially when the subject is asked to show what is missing.

Instructions:

Begin by saying:
"HERE ARE SOME PICTURES [POINT TO PICTURE BOOK]. LOOK AT EACH PICTURE CAREFULLY AND TELL WHAT IS MISSING (GONE). WHAT IS WRONG?"
Opening the picture booklet to the first picture say:
"LOOK AT THIS PICTURE [POINT]. WHAT IMPORTANT PART IS MISSING? WHAT IS WRONG?"

Additional Instructions:

Introduce each new picture saying:
"WHAT IS MISSING (GONE) IN THIS PICTURE [POINT]?"

Prompts:

1) If the subject names the picture without indicating the missing part, say:
"YES, BUT WHAT IS MISSING (GONE)? WHAT IS WRONG?"
2) If the subject names something not in the picture say:
"SOMETHING IS MISSING IN THE PICTURE. NOT HERE [POINTING TO THE AREA AROUND THE PICTURE]. THE PICTURE IS WRONG. WHAT IS MISSING?"

3) If the subject names a nonessential part, say: "YES, BUT WHAT IMPORTANT PART IS MISSING (GONE)?"

TEST 4 PICTURE ARRANGEMENT (SUPPLEMENTAL) OTHER

All subjects will do each of the three picture arrangement samples.

Sample 1: ONE

Instructions:

After placing the cards before the subject in numerical order (as indicated on the rear of the cards) say:

"SEE THESE NUMBERS [POINT]. THEY ARE WRONG. WATCH ME. I WILL ARRANGE (ORDER) THEM. VERY FAST."

After arranging them in the correct order (ONE), point to each and say:

"SEE I ARRANGED (ORDER) THEM. FIRST [POINT], SECOND [POINT] AND THIRD [POINT]."

Again placing the cards before the child in numerical order say:

"NOW YOU TRY IT. ARRANGE (ORDER) THEM. WORK VERY FAST."

Prompts:

If the subject fails to understand the task, say:

"NO WATCH ME AGAIN."

Mix the cards and say:

"NOW THEY ARE WRONG. I WILL ARRANGE (ORDER) THEM."

Upon completion say:

"FIRST [POINT], SECOND [POINT], THIRD [POINT]."

Additional Instructions:	Then mixing the cards, say: "NOW YOU TRY IT. ARRANGE (ORDER) THEM."
Confirmation:	Upon successful completion, say: "RIGHT!! FIRST [POINT], SECOND [POINT], THIRD [POINT]. THEY ARE IN ORDER."

Sample 2: EAT

Instructions:	Place the cards in numerical order before the child and say: "THESE PICTURES TELL A STORY ABOUT A FISH [POINT]. THEY ARE WRONG. ARRANGE (ORDER) THEM. WORK FAST. READY? START!."
Prompts:	If the subject fails, say: "NO." Arrange the pictures as before and say: "WATCH ME. NOW, THEY ARE WRONG [POINT]. I WILL ARRANGE (ORDER) THEM VERY FAST." Upon completion say: "SEE THEY ARE RIGHT. FIRST, THE BIG FISH SEES THE LITTLE FISH [POINT]. THEN THE BIG FISH FOLLOWS THE LITTLE FISH [POINT]. THEN THE BIG FISH EATS THE LITTLE FISH [POINT]."
Additional Instructions:	Scramble the pictures and say: "NOW YOU TRY IT. WORK FAST."

Confirmation:	Upon successful completion by the subject say: "RIGHT, VERY GOOD.* FIRST, THE BIG FISH SEES THE LITTLE FISH [POINT]. THEN THE BIG FISH FOLLOWS THE LITTLE FISH [POINT]. THEN THE BIG FISH EATS THE LITTLE FISH [POINT]. THEY ARE IN ORDER."
Sample 3: CAR	
Instructions:	Place the cards in numerical order before the subject and say: "THESE PICTURES TELL A STORY ABOUT A WRECK [POINT]. THEY ARE WRONG. YOU ARRANGE (ORDER) THEM RIGHT. WORK VERY FAST. READY? START!"
Prompts:	If the subject arranges them incorrectly say: "WATCH ME. THAT IS WRONG [POINT]. I WILL ARRANGE THEM RIGHT." After placing the pictures in the correct order say: "SEE, NOW THEY ARE RIGHT. THEY ARE IN THE RIGHT ORDER. FIRST [POINT], THEY ARE DRIVING. SECOND [POINT], THEY WRECK. THIRD [POINT], THEY ARGUE."

*NOTE: This would be a good point to elicit a small language sample from the subject by having him/her to tell or repeat the story. The same can be done for Sample 3 (CAR).

Additional Instructions:	Scramble the pictures and say: "NOW YOU TRY IT. ARRANGE (ORDER) THEM. WORK FAST."
Confirmation:	Upon successful completion of the arrangement say: "FIRST [POINT], THE CARS ARE DRIVING. SECOND [POINT], THEY WRECK. THIRD [POINT], THEY ARGUE."

TEST 4 PICTURE ARRANGEMENT (ALTERNATE) OTHER

Sample: SCALES

Instructions: Place the three pictures before the subject as indicated in the Wechsler instructions. Then say:

"THESE PICTURES [POINTING TO PICTURES IN SWEEPING MOTION] TELL A STORY ABOUT A LADY (WOMAN). THE LADY WEIGHS HERSELF. NOW THE PICTURES ARE IN THE WRONG ORDER."

Then demonstrate the task saying:

"WATCH ME PUT THEM IN THE RIGHT ORDER."

After demonstrating the task, say:

"FIRST, THE LADY IS WALKING TOWARD THE SCALE [POINT - SAY: 1ST]. SECOND, THE LADY GETS ON [POINT - SAY: 2ND]. THIRD, THE LADY WALKS AWAY [POINT - SAY: 3RD]."

ITEM I: FIGHT

Instructions: Placing the stack of pictures face down before the subject say:

"THESE PICTURES [POINT TO THE STACK OF PICTURES] TELL A STORY ABOUT A FIGHT."

Lay out the pictures in the prescribed manner and then say:

"NOW THE PICTURES ARE IN THE WRONG ORDER. YOU ARRANGE (ORDER) THEM CORRECTLY (RIGHT). WORK VERY FAST. READY? START!"

Prompts:

If the subject fails to respond or responds incorrectly, say:
"WATCH ME."
After working the task, tell the story by saying:
"FIRST, THE TWO MEN ARE FIGHTING (BOXING) [POINT AND SAY: 1ST]. SECOND, ONE MAN IS KNOCKED DOWN [POINT AND SAY: 2ND]. THIRD, THE MAN IS CARRIED OUT [POINT AND SAY: 3RD]."

Additional Instructions:

Placing the pictures before the subject in the prescribed manner, say:
"YOU TRY IT AGAIN. WORK VERY FAST! READY? START!"

ITEM II: PICNIC

Instructions:

Place the pictures before the subject in the prescribed manner and say:
"THESE [POINTING TO THE PICTURE SERIES] ARE WRONG. ARRANGE (ORDER) THEM CORRECTLY (RIGHT). WORK VERY FAST. READY? START!"

Prompts:

If the subject fails to respond or responds incorrectly, say:
"WATCH ME."
After working the task, tell the story by saying:
"FIRST, THE MAN AND WOMAN ARE WALKING AND A DOG FOLLOWS [POINT AND SAY: 1ST]. SECOND, THE DOG STEALS THE CHICKEN [POINT AND SAY: 2ND]. THIRD, THE MAN AND WOMAN NOTICE (SEE) THE CHICKEN IS GONE [POINT AND SAY: 3RD]."

Additional Instructions: Rearranging the pictures as prescribed by the Wechsler manual, say:
"NOW YOU TRY IT AGAIN. WORK VERY FAST! READY? START!"

ITEM III: FIRE

Instructions: Place the pictures before the subject in the prescribed manner and say:
"THESE [POINT TO THE PICTURE SERIES] ARE WRONG. ARRANGE (ORDER) THEM CORRECTLY (RIGHT). WORK VERY FAST! READY? START!"

Prompts: If the subject fails to respond or responds incorrectly say:
"NO. THIS IS THE FIRST PICTURE [POINT TO THE FIRST PICTURE]. THE MOTHER SCOLDS (SHAKING FINGER) THE BOY."

Additional Instructions: Put the 1st picture in the proper place. Then say:
"YOU PUT THESE [POINTING TO THE REMAINING 3] IN THE RIGHT ORDER. READY? START!"

ITEM IV: PLANK

Instructions: Place the pictures before the subject in the prescribed manner and say:
"THESE [POINT TO THE PICTURE SERIES] ARE WRONG. ARRANGE (ORDER) THEM CORRECTLY (RIGHT). WORK VERY FAST! READY? START!"

Prompts:	If the subject fails to respond or responds incorrectly say: "NO. THIS IS THE FIRST PICTURE [POINT TO THE FIRST PICTURE]. THE BOY IS WALKING TOWARD THE RIVER."
Additional Instructions:	Put the 1st picture in the proper place. Then say: "YOU PUT THESE IN THE RIGHT ORDER. READY? START!"
ITEM V-XII	
Instructions:	Place the pictures before the child and say: "ARRANGE (ORDER) THESE CORRECTLY (RIGHT). WORK FAST! READY? START!"

TEST 6 BLOCK DESIGN (SUPPLEMENTAL) OTHER

Place the Block Design Sample Card before the student and the 4 appropriate two-dimensional squares as indicated by the code on top of each design.

Instructions: Sample 1.

First say:
"WATCH ME [POINT]."
Then arrange the 4 squares in the empty box so that they match the uppermost sample box.
"SEE THEY ARE THE SAME."
Allow 10 or 15 seconds for the subject to study it. Then mix up the 4 squares and say:
"NOW YOU TRY IT [POINT]."

Prompts:

If student fails say:
"WATCH ME AGAIN [POINT]."
Demonstrate the solution again. Wait 10 seconds and scramble. Then allow the student to try it saying:
"NOW, YOU TRY IT AGAIN [POINT]."

Instructions: Sample 2.

First say:
"NOW YOU TRY THIS [POINT]. THEY MUST BE THE SAME."
Allow the student to copy the uppermost box in the space provided below it.

Prompts:

If student fails say:
"NO, WATCH ME [POINT]."

Demonstrate the solution. Wait 10 seconds and scramble. Then allow the student to try it saying:
"NOW YOU TRY IT AGAIN [POINT]. THEY MUST BE THE SAME."

Instructions: Sample 3.

First say:
"WATCH ME [POINT]."
Arrange the 4 squares in the empty box so that they match the uppermost sample box.
"SEE THEY ARE THE SAME [POINT]."
Allow 10 or 15 seconds for the subject to study it. Then mix up the 4 squares and say:
"NOW YOU TRY IT [POINT]. THEY MUST BE THE SAME."

Prompts:

If student fails say:
"WATCH ME AGAIN [POINT]."
Demonstrate solution again. Wait 10 seconds and scramble. Then allow the student to try it saying:
"NOW, YOU TRY IT AGAIN [POINT]. THEY MUST BE THE SAME."

Instructions: Sample 4.

First say:
"NOW YOU TRY THIS [POINT]."
Allow the student to copy the uppermost box in the space provided below it.

Prompts:

If student fails say:
"NO, WATCH ME DO IT [POINT]."
Demonstrate the solution. Wait 10 seconds and scramble. Then allow the student to try it saying:
"NOW, YOU TRY IT AGAIN [POINT]. THEY MUST BE THE SAME."

TEST 6 BLOCK DESIGN (ALTERNATE) OTHER

Using the materials as prescribed by the regular Wechsler manual you will proceed in the usual order.

Instructions: Design 1. First holding 4 blocks (all oriented in the same direction) between thumb and forefinger, rotate them to correspond to the following instructions: "SEE [POINT]? THEY ARE ALL ALIKE (SAME); SOME ARE ALL RED [POINT]; SOME ARE ALL WHITE [POINT]; SOME ARE RED AND WHITE - 1/2 RED AND 1/2 WHITE." Scrambling the blocks on the table, say: "WATCH ME. I WILL JOIN THEM." After completing Design 1 have the student copy it, saying: "JOIN THESE [POINT TO SCRAMBLED BLOCKS] LIKE THESE [POINT TO EXAMPLE]. THEY MUST BE THE SAME."

Prompts: If student fails scramble the blocks and say: "WATCH ME AGAIN."

	Demonstrate the solution. Wait 10 seconds and scramble the students blocks. Then allow the student to try it again, saying: "NOW YOU TRY AGAIN. THEY MUST BE THE SAME."
Instructions: Design 2.	After constructing Design 2 for the subject, say: "NOW JOIN THESE [POINT]."
Prompts:	If student fails, scramble the blocks and say: "WATCH ME AGAIN." Demonstrate solution. Wait 10 seconds and scramble the students blocks. Then allow the student to try it again, saying: "NOW YOU TRY AGAIN. THEY MUST BE THE SAME."
Instructions: Design 3.	After exposing Design 3 to the student, say: "NOW WE WILL JOIN THESE [POINT]. THEY NEED TO (MUST) BE LIKE THIS PICTURE [POINT]. WATCH ME FIRST." After demonstrating, say: "SEE THE TOPS [POINTING TO THE BLOCKS IN A CIRCULAR MANNER] ARE LIKE THE PICTURE." After scrambling the blocks, say: "JOIN THESE [POINTING] LIKE THE PICTURE."

Prompts:		Scramble the blocks and say: "No. WATCH ME AGAIN." Demonstrate solution, and allow 10 or 15 seconds to study it. Scramble the blocks and say: "NOW, TRY IT AGAIN."
Instructions:	Design 4-8.	With design book open face down to the next design, say: "NOW JOIN THESE [POINT] LIKE THIS [POINT TO DESIGN BOOK]. WORK FAST. TELL ME WHEN YOU ARE FINISHED. READY? START!"
Instructions:	Design 9-11.	Placing the nine blocks before the subject, say: "NOW USE 9 BLOCKS. JOIN THEM LIKE THIS [POINT TO DESIGN BOOK]. READY? START!"

TEST 8 OBJECT ASSEMBLY (ALTERNATE) OTHER

Instructions: Sample A. Placing the parts to Item A in front of the child in accordance with the Wechsler manual, say:
"IF I JOIN (PUT TOGETHER) THESE PARTS [POINT], YOU WILL SEE AN APPLE. WATCH ME JOIN THE PARTS."
After the child studies the assembled item for 10 seconds, scramble them, then arrange them as per the manual. Then have the subject practice it saying:
"YOU JOIN THESE PARTS CORRECTLY (RIGHT). WORK QUICKLY (FAST)! READY? BEGIN!"
If the child fails or does not work quickly, scramble them (not in accordance to the manual) and have him try again, saying:
"TRY AGAIN. WORK QUICKLY (FAST)! READY? BEGIN!"

Item GIRL. Place the parts to Item G before the child according to the manual. Keep them covered until you have finished the instructions. Have the student start by saying:
"IF YOU JOIN (PUT TOGETHER) THESE PARTS CORRECTLY (RIGHT) [POINT TO COVERED PARTS], YOU WILL SEE A GIRL. READY? START! [UNCOVER PARTS]."

Item HORSE. Place the parts to Item H on the table in the prescribed manner and while they are still covered say:
"YOU JOIN THESE PARTS [POINT]. WORK QUICKLY (FAST)! READY? BEGIN! [UNCOVER]."

Item CAR. Using the method, say:
"YOU JOIN THESE [POINT] PARTS. WORK QUICKLY (FAST)! READY? BEGIN! [UNCOVER]."

Item FACE. Using the method, say:
"YOU JOIN THESE [POINT] PARTS. WORK QUICKLY (FAST)! READY? BEGIN! [UNCOVER]."

TEST 10 CODING A & B (SUPPLEMENTAL) OTHER

Place the Coding sample sheet before the student and give him/her a red pencil with which to mark.

Instructions: Sample

Begin by saying:
"SEE THESE PICTURES [POINT TO THE PICTURES AT TOP]? YOU WILL SEE SOMETHING IN EACH PICTURE. EACH PICTURE HAS SOMETHING IN IT [POINT TO EACH]. FIRST, WATCH ME."
Mark slowly the first row, pointing alternately between the symbols at the top and those within the sample. When you have completed the first row stop and say:
"NOW I WILL FINISH THE OTHER PICTURES VERY FAST."
When you have completed the entire sample page, say:
"SEE I FINISHED EACH ONE, 1ST, 2ND, 3RD, ETC. [POINT WITH SWEEPING MOTION] VERY FAST."

Additional Instructions:

Placing a clean Coding sample sheet before the subject and say:
"NOW YOU FINISH EACH PICTURE 1ST, 2ND, 3RD, ETC., AND WORK VERY FAST! READY? START!"

Prompts:

If child makes errors indicating that he/she does not understand the task, repeat the instructions using a new Coding sample sheet.

Then allow the student to try it again as before.

TEST 10 CODING A (ALTERNATE) OTHER

Placing the Coding A Test Sheet before the student with a blank sheet of paper covering the B portion and give the student a red pencil.

Instructions:

Begin by saying:

"HERE ARE SOME MORE PICTURES [POINT], A BALL [POINT], TRIANGLE [POINT], A CROSS [POINT] AND A SQUARE [POINT]. EACH PICTURE HAS SOMETHING IN IT [POINT TO EACH SYMBOL AND THE MARK IN IT MAKING A MOTION AS IF WRITING OVER THE MARKS]."

Then do the first 2 symbols in the sample by saying:

"NOW WATCH ME FINISH THE PICTURES."

When you finish point to the two circles in succession and say:

"SAME (ALIKE)."

Then point to the two stars and say:

"SAME (ALIKE)."

Then have the student do the next 3 by saying:

"NOW YOU FINISH THE NEXT 3. STOP HERE [POINTING TO THE END OF THE SAMPLE BOX]."

Prompts:

If child does not understand or makes errors, say:
"FINISH THESE [POINTING TO SAMPLES] LIKE (SAME) THESE [POINTING TO EXAMPLES AT TOP]!"
Erase the entire sample box and say:
"TRY IT AGAIN, MAKE THEM ALIKE (SAME)."

Instructions:

Have the subject begin the test by saying:
"NOW START HERE [POINT AT THE FIRST TEST ITEM], AND FINISH EACH ONE IN ORDER. WORK VERY FAST! READY? START!"

TEST 10 CODING B (ALTERNATE) OTHER

Place the Coding B Test Sheet before the student with a blank sheet of paper covering the B pattern and give him/her a red pencil with which to work.

Instructions:

Begin by saying:
"HERE ARE SOME MORE [POINTING TO THE EXAMPLES AT THE TOP]. WE HAVE THE NUMBERS 1, 2, 3, 4, 5, 6, 7, 8, AND 9 IN BOXES [POINT TO EACH NUMBER SUCCESSIVELY]. EACH BOX HAS A NUMBER AND SOMETHING UNDER IT [POINT TO EACH NUMBER AND THE SYMBOLS BELOW IT MAKING A MOTION AS IF WRITING OVER THE SYMBOLS]."
Then do the first 3 numbers in the sample by saying:
"NOW WATCH ME."
When you finish point to the two 2's in succession and say:
"SAME (ALIKE)."
Then point to the two 1's and say:
"SAME (ALIKE)."
Then the two 4's saying:
"SAME (ALIKE)."
Then have the student do the next 4 saying:
"NOW YOU FINISH THE NEXT 4, WORK TO HERE [POINTING TO THE END OF THE SAMPLE BOX]."

Prompts:

If child does not understand or makes errors, say:
"FINISH THESE [POINTING TO SAMPLES] LIKE (SAME) THESE [POINTING TO EXAMPLES AT TOP]!"
Erase the entire sample box and say:
"TRY IT AGAIN. THEY SHOULD LOOK ALIKE (SAME)."

Instructions:

Have the subject begin the test by saying:
"NOW START HERE [POINT AT THE FIRST TEST ITEM], AND FINISH EACH ONE IN ORDER. WORK VERY FAST! READY? START!"

TEST 12 MAZES (SUPPLEMENTARY) OTHER

Place the MAZE SAMPLE A, B & C before the subject and proceed as follows.

Instructions: Sample A. First say:

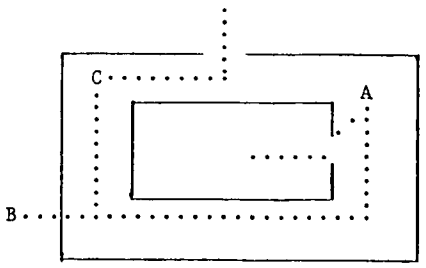
"SEE THE BOY [POINT]? SEE THE CAT [POINT]? THE BOY WANTS TO PLAY WITH THE CAT. THE BOY MUST GO OUT. WATCH ME. I WILL HELP THE BOY GO OUT."

Starting at the boy and moving to point A as indicated below, say:

"WRONG."

Continuing to point B say:

"WRONG."



Upon reaching point C, raise pencil and say:

"WRONG. YOU CAN'T DO THAT [POINTING TO HAND RAISED]."

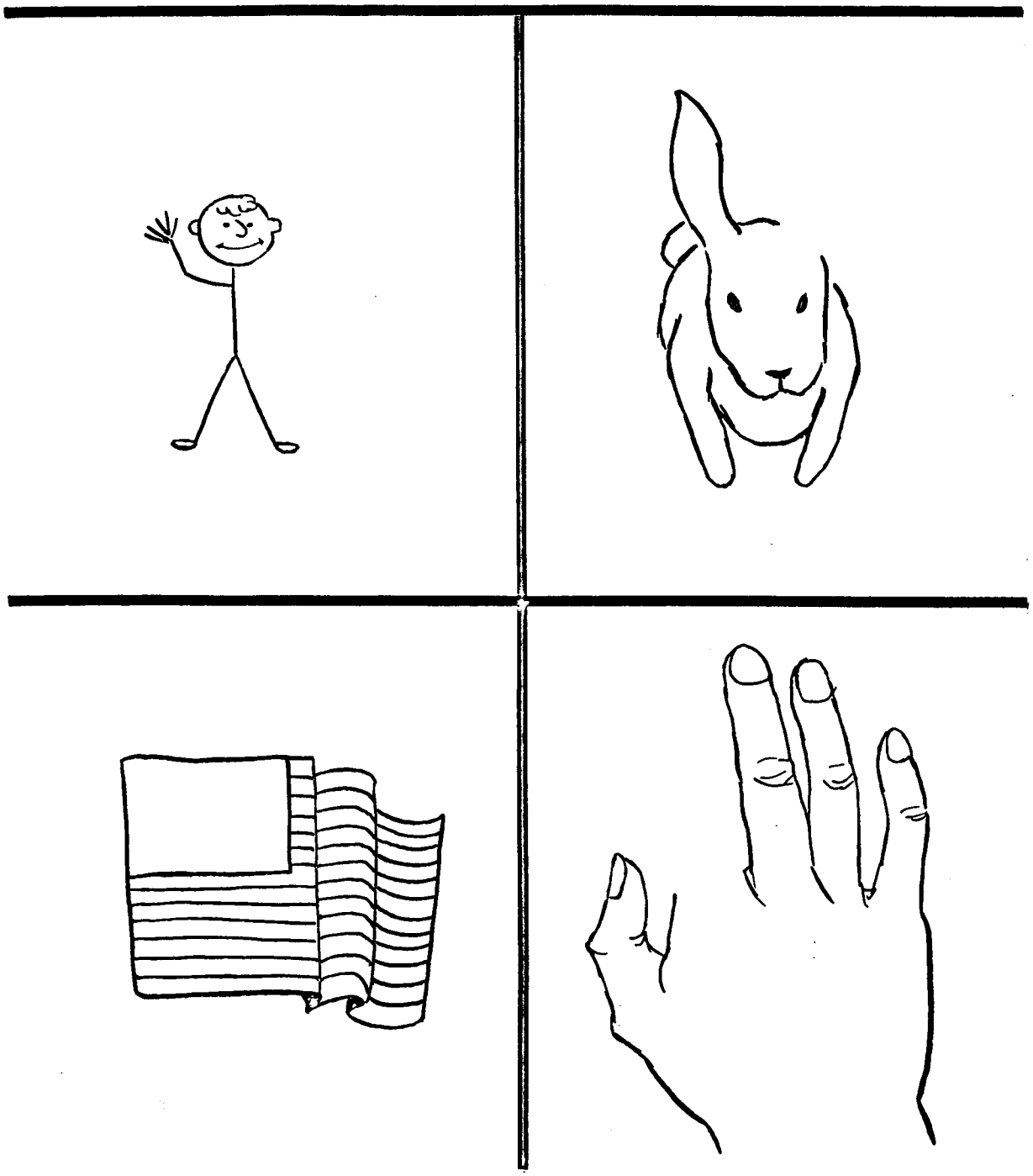
Pushing your writing hand back to the page and finishing, say:

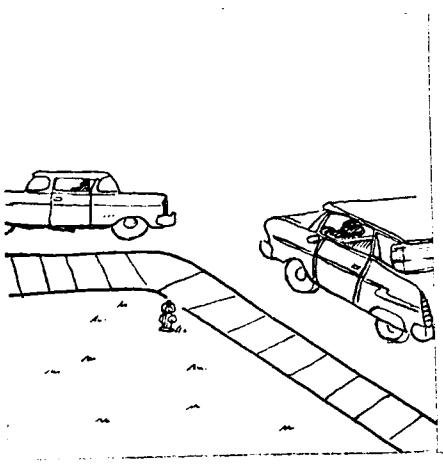
"NOW THE BOY CAN PLAY WITH THE CAT."

Instructions:	Sample B.	Using Sample B say: "WATCH ME AGAIN. I WILL HELP THE BOY GO OUT. FAST!" Upon completion say: "THAT IS RIGHT. THAT WAS FAST."
Instructions:	Sample C.	Start Sample C by giving him a red pencil and saying: "NOW YOU HELP THE BOY. GO FAST! READY? START!"
Prompts:		If the child turns incorrectly or crosses a barrier say: "NO. YOU CAN'T DO THAT."

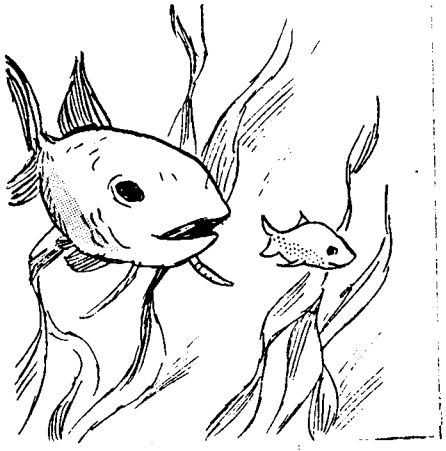
NOTES

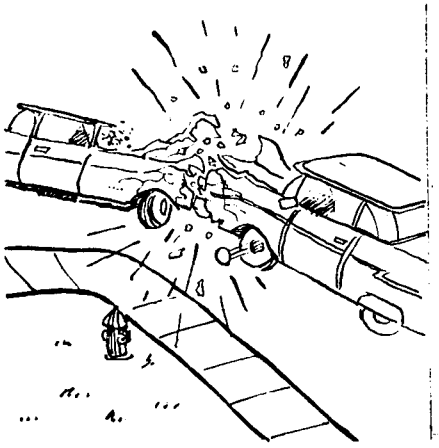
PICTURE COMPLETION





1





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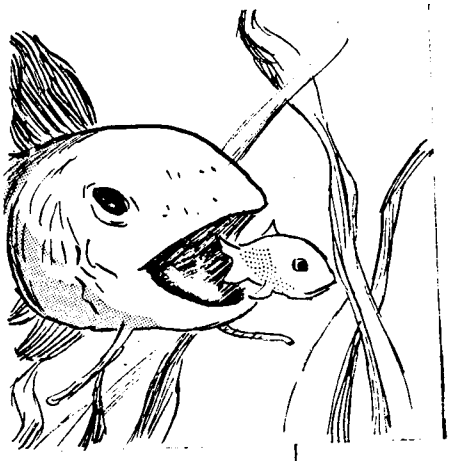

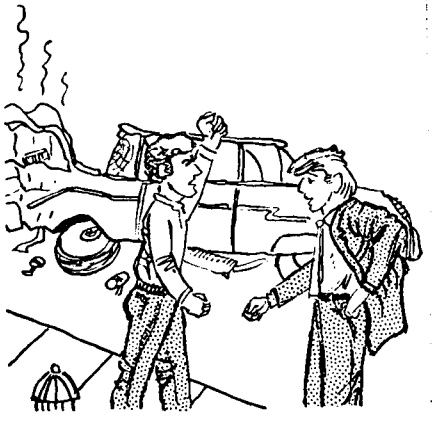

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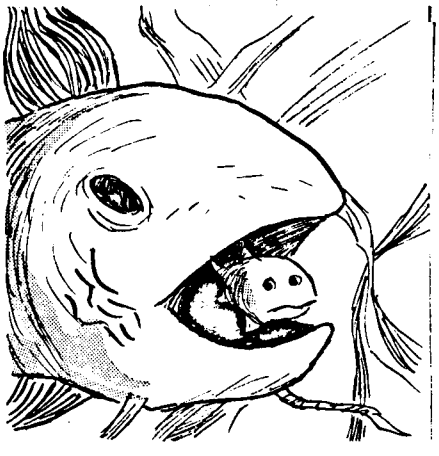
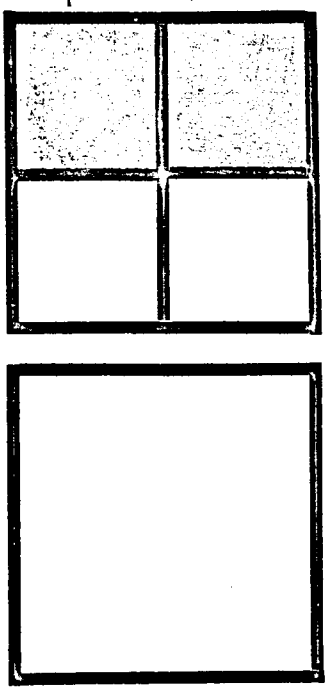
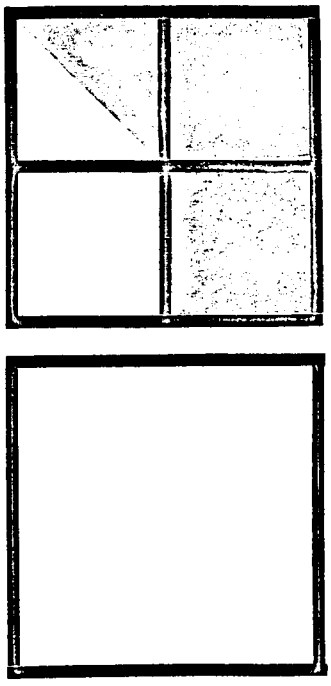


BLOCK DESIGN

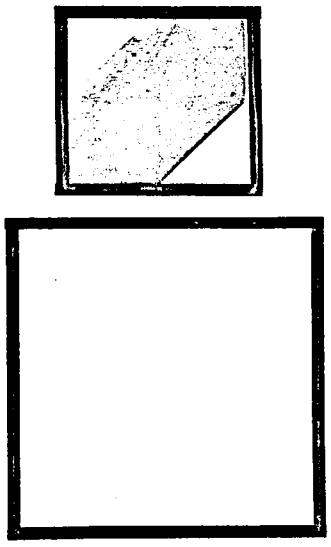
Sample 1 (2-R, 2-W)



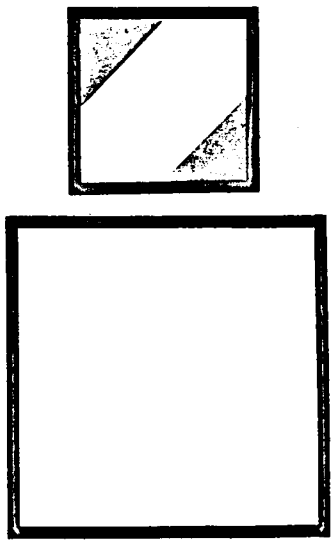
Sample 2 (2-R,1-W,1-RW)



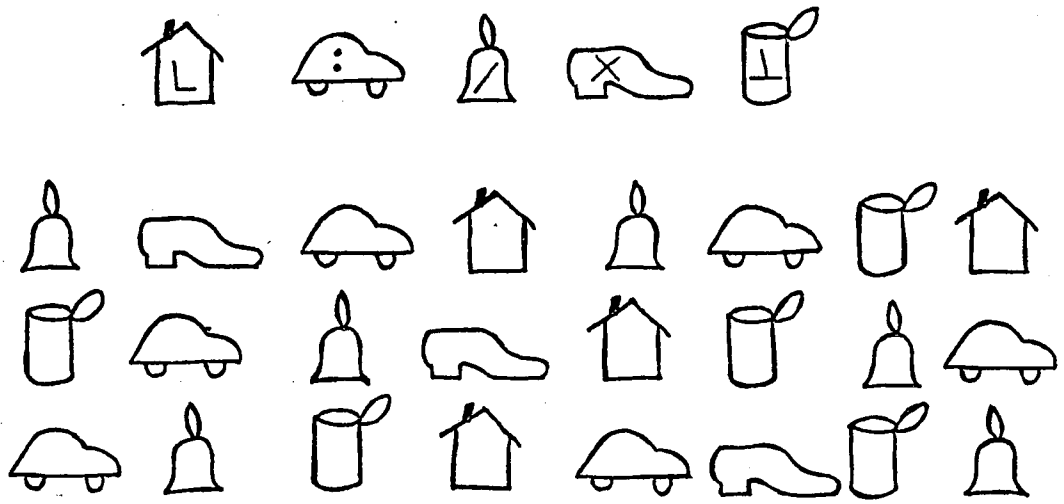
Sample 3 (2-R,RW)



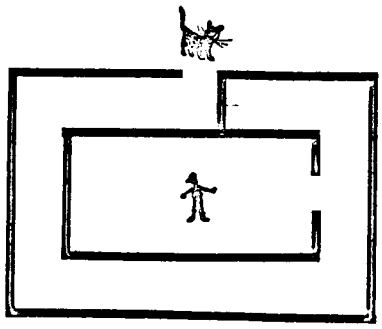
Sample 4 (2-W,RW)

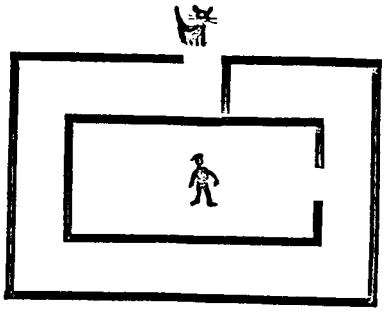


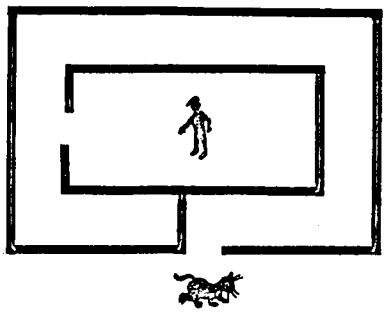
CODING
Sample



MAZES
SAMPLE A,B&C







APPENDIX B

FORMS AND LETTERS

OBSERVER QUESTIONNAIRE

Subject No. _____

Examiner _____

Observer _____

Test Date _____

Supplementary Instructions:

1. Were the sample items used? _____

2. Were the supplementary instructions followed closely? _____

   Comments: _____

   _____

   _____

   _____

3. Did the subject appear to understand the supplementary instructions?

   Comments: _____

   _____

   _____

   _____

Alternate Instructions:

4. Were the Alternate Instructions followed closely? _____

   Comments: _____

   _____

   _____

   _____

5. Did the subject appear to understand the supplementary instructions?

   Comments: _____

   _____

   _____

   _____

General

6. Did the examiner seem to be familiar with the materials provided? _____

   Comments: _____

   _____

   _____

   _____

7. What mode of communication was used? _____

EXAMINER QUESTIONNAIRE

I. Reaction to the materials

A. Organizational quality of materials provided (format).

1 2 3 4 5

Comments: _____

_____

_____

_____

B. Quality of printed materials and packaging.

1 2 3 4 5

Comments: _____

_____

_____

_____

C. Overall clarity of instructions to the student.

1 2 3 4 5

Comments: _____

_____

_____

_____

D. Overall clarity of instructions to the examiner.

1 2 3 4 5

Comments: _____

_____

_____

_____

_____

_____

6. Mazes

1 2 3 4 5

Comments: _____

_____

_____

_____

F. Effectiveness of supplemental items provided (by subtest).

1. Picture Completion

1 2 3 4

Comments: _____

_____

_____

2. Picture Arrangement

1 2 3 4

Comments: _____

_____

_____

3. Block Design

1 2 3 4

Comments: _____

_____

_____

4. Object Assembly

1 2 3 4

Comments: _____

_____

_____

E. Effectiveness of instructions (by subtest).

1. Picture Completion

1 2 3 4 5

Comments: _____

_____

_____

_____

2. Picture Arrangement

1 2 3 4 5

Comments: _____

_____

_____

_____

3. Block Design

1 2 3 4 5

Comments: _____

_____

_____

_____

4. Object Assembly

1 2 3 4 5

Comments: _____

_____

_____

_____

5. Coding

1 2 3 4 5

Comments: _____

_____

5. Coding

   1 2 3 4

   Comments: _____

   _____

   _____

6. Mazes

   1 2 3 4

   Comments: _____

   _____

   _____

G. Will you continue using all or part of this material?

   All _____ Part _____

   (If "Part" answer the following)

   1. Which parts would you continue using and why?

      _____

      _____

      _____

      _____

   2. Which parts would you not use and why?

      _____

      _____

      _____

      _____

   Additional Comments:

   _____

   _____

   _____

   _____

THE UNIVERSITY OF TENNESSEE
COLLEGE OF EDUCATION
KNOXVILLE, TENNESSEE 37916

DEPARTMENT OF SPECIAL EDUCATION
AND REHABILITATION

TELEPHONE: AREA CODE 615-974-2321

Your participation in this study is greatly appreciated. It is hoped that the information resulting from this study and your cooperation will lead to a more appropriate assessment of the hearing impaired child.

We have solicited the aid of about 30 psychologists throughout the country. Each psychologist will return at least 5 protocols generated from the use of this "Adaptation". At least one of these assessments should be done under the observation of another person. The observer need not be a psychologist, however it would be helpful if he/she were familiar with assessment procedures. An additional manual is included for this reason.

Forms are provided for reporting tests resulting from this "Adaptation" as well as any previous WISC or WISC-R score which may be on record. All scores should be reported anonymously, however a record should be maintained which would allow identification of the student by student number (any 3 digit number).

Additional forms and questionnaires should be self-explanatory. Please note the Release Form which has been included for your convenience. We will need a release from each student involved (a copy will do).

The criterion by which the subjects are to be selected include: 1) Prelingually deaf or deafened; 2) Loss of 70 db, pure tone average, in best ear; 3) No other apparent handicap other than corrected vision; 4) Age appropriate for the WISC-R.

In order that the sample will represent the full range of ages covered by the WISC-R, we would ask that you try to choose one student representing each of the 5 ranges below. It is not essential to have only one from each as long as they do not cluster within only one or two groups.

Age 6-0 to 7-11
Age 8-0 to 9-11
Age 10-0 to 11-11
Age 12-0 to 13-11
Age 14-0 to 16-11

Upon completion of the 5 tests, please forward the results, questionnaires, and release forms. These will need to be returned in the later half of May, 1979.

Thank you very much for your cooperation in this effort. Feel free to call or write at any time.

Sincerely,

Steven Ray

Steven Ray
Graduate Assistant

SR:km

P.S. Telephone (Office) (615) 974-2321
(Home) (615) 637-5313

Dear _____:

As a part of our evaluation this institution frequently administers the "Wechsler Intelligence Scales for Children-Revised". The Performance section of this test is commonly used with deaf children. This test, however, was not especially designed for use with deaf children. The instructions and language of this test must be altered considerably in order to yield a satisfactory assessment. To date these alterations have been left to the individual psychologist and therefore variations in methods of presentations have made it difficult to draw conclusions about the abilities of deaf children as compared to hearing children.

This institution would like to cooperate with Mr. Steven Ray from the Department of Educational Psychology at the University of Tennessee, in the evaluation of a standardized method of test presentation which e has developed. To accomplish this, we would like to send your child's test scores anonymously to Mr. Ray for comparison with students who were tested before this new method of presentation was developed. Again we assure you that your child's name will not appear on the test results nor will his/her test be identifiable in any way.

This method of test presentation in no way changes the test items with which it is to be used. Mr. Ray's manual merely provides the student with supplementary items which are not scored and it also changes the instructional language used in the test, thus aiding the deaf child to better understand the instructions. Thus we feel that your cooperation will perhaps yield information which would aid in the future assessment of other deaf children.

If you should require more detailed information regarding these procedures you may address your inquiries to the following address:

Mr. Steven Ray
Department of Special Education
Room 10, Claxton Education Building
University of Tennessee
Knoxville, Tennessee 37916

If at any point you wish to have your child's test scores withdrawn, you may request this from the following address:

Your withdrawal of consent will in no way cause prejudicial treatment toward your child.

I hereby give permission for _____ to be tested using Mr. Ray's manual.
Child's Name

_____ _____
Date Signature of Parent or Guardian

APPENDIX C

RAW DATA

I.D.No.	Age	Demographics								PC	PA	BD	OA	CD	PIQ
1-5	6-9	10	11	12	13	14	15	16	17-18	19-28					29-31
444TL	13 7	F	W	S	E	P	P	R	HH	7	13	10	13	11	106
333TL	14 1	F	W	S	E	P	M	R	HH	7	13	10	11	12	102
666TL	10 1	M	W	S	E	C	C	R	HH	6	5	10	9	8	84
213TL	8 3	M	N	S	E	C	O	R	HH	2	1	2	7	6	61
123TL	8 5	M	N	S	E	C	O	R	HH	4	1	4	6	8	65
001RB	11 1	F	W	W	E	C	C	U	DD	14	15	14	15	9	124
002RB	9 5	F	W	W	E	C	C	U	DD	15	12	12	14	12	121
003RB	13 9	M	W	W	E	C	P	U	HH	7	7	7	14	9	91
005RB	15 3	M	W	W	E	C	M	U	HH	12	9	10	13	10	105
004RB	6 4	F	W	W	E	C	P	U	HH	5	7	10	10	7	85
208EM	1410	M	W	W	E	P	O	U	HH	14	9	14	14	13	120
046EM	17 5	M	W	W	E	C	O	U	DD	11	11	11	8	17	111
128EM	11 1	F	W	W	E	P	L	U	HH	5	1	6	4	2	42
231EM	14 3	M	W	W	E	P	O	U	HH	12	11	9	11	12	106
415EM	14 3	M	W	W	E	P	O	U	HH	18	12	15	17	10	131
013MK	13 4	F	W	N	E	P	C	U	HH	7	15	8	7	12	98
014MK	1411	M	W	N	E	C	C	U	HH	8	8	4	11	8	85
015MK	14 7	M	W	N	E	P	M	U	HH	8	9	7	12	6	88
012MK	12 9	F	W	N	E	P	P	U	HH	10	11	9	10	16	100
011MK	14 5	F	W	N	E	C	P	U	HH	8	6	8	11	10	90
424JV	1210	M	N	N	E	P	C	U	HH	11	13	15	16	14	128
426JV	14 5	M	W	N	E	P	M	U	HH	12	9	12	12	11	108
430JV	14 6	F	W	N	E	P	M	U	HH	11	9	10	12	9	101
501JV	9	M	W	N	E	P	M	U	HH	6	5	7	9	5	75
502JV	711	M	W	N	E	P	C	U	HH	12	11	11	10	13	109
503JV	1111	M	W	N	E	P	M	R	HH	10	8	6	8	10	86
504JV	15 2	F	W	N	E	P	M	U	HH	9	16	8	12	10	106
508JV	14 7	M	W	N	E	P	M	U	HH	16	11	12	19	10	126
703JB	7 7	F	W	S	E	P	L	R	HH	11	8	10	10	11	100
313JB	10 3	M	W	S	E	C	M	R	HH	10	11	11	13	8	104

I.D.No.	Age	Demographics								PC	PA	BD	OA	CD	PIQ
1-5	6-9	10	11	12	13	14	15	16	17-18	19-28					29-31
478JB	8 2	M	W	S	T	C	M	U	HH	11	9	13	8	8	98
822JB	1611	M	W	S	T	P	O	U	HH	6	5	8	10	10	85
808JB	16 2	F	W	S	T	C	L	R	HH	8	9	8	6	7	84
002AM	14 2	M	W	W	T	C	L	U	HH	7	6	8	8	2	74
001AM	14 5	M	W	W	T	C	P	U	HH	6	8	8	8	9	86
005AM	14 9	M	N	W	T	P	L	R	HH	10	12	12	11	8	104
004AM	13 3	M	W	W	O	C	O	U	HH	12	9	10	12	11	105
003AM	10 1	M	W	W	O	C	M	U	DD	11	11	16	17	12	122
001DW	12 2	F	W	N	O	C	C	U	HH	10	12	14	15	11	117
002DW	6 8	M	W	N	O	C	O	U	HH	10	10	10	8	10	96
003DW	8 4	F	W	N	O	C	M	U	HH	13	10	12	13	13	115
004DW	10 5	F	W	N	O	C	P	U	HH	15	13	14	17	18	138
005DW	11 5	M	W	N	O	C	C	U	DD	12	11	10	13	8	105
006DW	11 7	M	N	N	O	C	M	U	HH	13	11	12	12	11	112
002JJ	911	M	W	W	T	P	O	U	HH	12	11	9	10	8	100
001JJ	11 9	F	W	W	T	P	L	U	HH	10	1	7	9	4	74
003JJ	16 3	F	W	W	T	P	P	U	HH	3	7	5	4	6	68
004JJ	12 2	F	W	W	T	P	L	R	HH	4	1	5	6	1	57
005JJ	11 7	M	W	W	T	P	L	U	HH	14	10	14	16	10	120
336RC	9 6	M	N	S	T	P	O	U	HH	6	4	7	9	6	82
337RC	11 3	F	N	S	T	P	L	R	HH	5	1	6	7	5	68
338RC	15 2	F	N	S	T	P	L	R	HH	8	6	2	11	5	75
339RC	1311	F	N	S	T	P	L	R	HH	8	1	1	6	1	65
340RC	14 3	F	N	S	T	P	L	R	HH	9	5	5	7	8	78
341RC	14 6	M	W	S	T	P	P	U	HH	9	1	7	8	6	77
342RC	7	F	W	S	T	P	P	R	HH	14	6	14	11	9	105
111SP	13 8	M	W	S	T	P	C	U	HH	13	15	18	19	10	135
112SP	14 4	M	W	S	T	P	C	U	HH	9	12	9	7	9	93
113SP	6 2	F	W	S	T	P	O	R	HH	11	14	10	12	12	112
114SP	8 7	M	W	S	T	P	C	U	DD	11	17	10	12	19	128

I.D.No.	Age	Demographics								PC	PA	BD	OA	CD	PIQ
1-5	6-9	10	11	12	13	14	15	16	17-18	19-28					29-31
115SP	14 7	M	W	S	T	C	M	U	HH	14	13	11	10	9	108
001TG	9 8	M	W	W	T	P	M	U	HH	14	12	17	10	9	128
002TG	10 0	F	W	W	T	P	P	U	HH	11	9	16	16	11	133
003TG	10 0	M	W	W	T	P	P	U	HH	11	8	9	12	8	104
004TG	7 6	F	W	W	T	C	P	U	HH	12	6	6	8	12	101
005TG	7 2	M	W	W	T	C	P	U	DD	14	18	12	15	13	143
001LC	15 2	M	W	N	T	C	C	U	HH	9	10	8	13	3	90
002LC	8 0	F	W	N	T	C	C	U	HH	11	8	11	8	10	96
003LC	11 8	F	W	N	T	C	O	U	HH	12	8	12	12	12	108
005LC	12 7	F	W	N	T	C	L	U	DD	15	11	12	10	9	109
004LC	8 9	F	W	N	T	C	P	U	DD	13	16	15	11	14	128
001GB	7 3	M	W	S	T	C	O	U	HH	8	4	7	9	13	87
002GB	11 3	F	W	S	T	C	C	U	HH	3	4	5	9	8	72
003GB	9 7	M	N	S	T	C	P	U	HH	7	9	4	3	9	75
004GB	1411	F	N	S	T	C	C	U	HH	9	7	6	8	9	85
005GB	7 3	F	N	S	T	C	O	U	HH	13	2	6	12	6	85
893MB	13 8	F	W	N	T	C	M	U	HH	9	7	8	6	4	78
894MB	14 2	M	W	N	T	C	O	U	HH	12	12	13	13	9	112
895MB	8 8	F	W	N	T	C	O	U	DD	8	11	8	4	9	86
897MB	10 7	M	W	N	T	C	M	R	HH	4	1	6	4	7	64
898MB	11 8	F	W	N	T	C	O	U	HH	9	11	9	12	11	102
899MB	7 3	F	W	N	T	C	O	R	HH	8	9	13	12	11	104
001JB	12 5	M	W	S	T	P	P	U	HH	14	9	12	9	8	102
002JB	11 3	F	W	S	T	P	M	U	HH	12	11	13	11	8	106
003JB	6 5	F	W	S	T	P	P	U	HH	9	11	8	11	12	101
004JB	9 9	M	W	S	T	C	M	U	HH	17	9	10	14	13	118
005JB	10 6	F	W	S	T	P	M	R	HH	9	11	11	11	13	106
525AV	13 6	F	W	C	T	C	L	U	DD	10	15	15	15	16	130
497AV	12 2	M	W	C	T	C	C	U	HH	10	14	11	10	11	108
333AV	7 4	F	W	C	T	C	C	R	DH	10	10	11	12	16	112

I.D.No.	Age	Demographics								PC	PA	BD	OA	CD	PIQ
1-5	6-9	10	11	12	13	14	15	16	17-18	19-28					29-31
278AV	15 3	M	W	C	E	C	M	R	HH	5	12	8	9	14	95
101AV	11 9	F	W	C	E	C	L	U	HH	10	8	10	9	8	92
001BA	9 6	M	W	N	E	C	M	U	HH	11	11	14	13	10	112
002BA	11 2	M	N	N	E	C	M	U	HH	5	9	11	8	4	82
003BA	9 6	F	W	N	E	C	P	U	DD	15	14	13	11	12	121
004BA	8 8	F	W	N	E	C	C	U	DD	12	14	13	15	10	120
005BA	11 7	F	W	N	E	C	P	U	HH	6	8	8	9	4	80
101MF	14 1	M	N	S	E	C	O	U	HH	10	9	9	11	10	98
202MF	10 0	M	N	S	E	C	L	U	HH	7	7	8	8	10	86
303MF	14 6	F	W	S	E	C	M	R	HH	10	9	12	10	12	104
001WS	13 8	M	W	N	E	C	O	U	HH	4	1	11	5	3	67
002WS	910	M	N	N	E	C	O	U	HH	9	12	14	9	9	104
003WS	6 8	M	N	N	E	C	O	U	HH	12	14	8	11	8	104
004WS	14 4	M	N	N	E	C	O	R	HH	9	11	6	9	7	100
005WS	1211	M	W	N	E	C	L	U	HH	11	6	8	11	7	90
006WS	1310	M	W	N	E	C	M	U	HH	6	7	5	5	3	77
007WS	14 0	M	W	N	E	C	O	U	HH	10	8	5	9	7	85
008WS	13 4	M	W	N	E	C	P	R	HH	13	13	19	14	12	130
009WS	15 1	F	W	N	E	C	L	R	HH	10	8	7	11	10	93
010WS	15 4	F	W	N	E	C	O	U	HH	10	8	4	5	3	73
011WS	14 2	F	W	N	E	C	P	U	HH	10	14	14	10	14	130
012WS	910	F	N	N	E	C	O	U	HH	1	9	8	6	12	80
013WS	1311	M	W	N	E	C	M	U	HH	10	14	7	7	4	88
014WS	1010	M	W	N	E	C	M	U	HH	11	11	15	17	11	121
016WS	11 6	F	W	N	E	C	C	U	DD	13	10	17	13	14	124
017WS	1211	M	W	N	E	C	P	R	DD	10	18	14	17	13	131
101SS	15 9	F	W	N	E	C	L	R		10	8	10	17	11	108
102SS	9 6	M	N	N	E	C	M	U	HH	8	11	6	8	6	85
103SS	9 7	M	W	N	E	C	L	U	HH	11	4	10	9	5	85
104SS	7 8	F	N	N	E	C	L	U	HH	15	10	11	10	12	111

I.D.No.	Age	Demographics								PC	PA	BD	OA	CD	PIQ
1-5	6-9	10	11	12	13	14	15	16	17-18	19-28					29-31
105SS	9 8	M	W	N	T	P	M	U	HH	12	11	12	15	6	108
301BW	6 3	M	W	S	T	P	O	U	HH	14	7	9	10	9	98
118BW	15 2	F	W	S	T	P	M	U	HH	8	10	9	11	11	98
222BW	16 6	F	W	S	T	P	M	U	HH	13	10	10	14	10	109
202BW	13 3	M	W	S	T	P	C	R	HH	10	11	10	13	8	102
465BW	9 1	F	W	S	O	P	O	R	HH	11	11	12	13	10	109
383BW	10 7	F	W	S	O	P	O	R	HH	10	9	8	9	6	88
001EG	14 7	F	W	C	O	C	M	R	HH	11	6	7	12	10	93
002EG	11 1	F	W	C	T	C	M	R	HH	6	8	7	7	9	84
003EG	11 4	F	N	C	T	P	C	U	HH	6	8	5	6	5	78
004EG	13 6	F	W	C	T	P	O	U	HH	8	11	8	15	13	106
005EG	9 0	F	W	C	T	P	O	R	HH	8	9	10	10	7	91
006EG	11 9	F	W	C	T	P	M	U	HH	4	3	1	2	9	60
007EG	9 10	M	W	C	T	C	C	U	HH	15	12	8	13	6	104
008EG	13 1	M	W	C	T	C	O	U	DD	13	12	12	11	12	114
009EG	14 1	F	W	C	T	P	M	R	HH	12	8	8	11	8	95

Key: Cols. 1-5 - Student I.D. No.
6-9 - Age: Year, Month
10 - Sex: Male(M), Female(F)
11 - Race: White(W), Non-white(N)
12 - Region: Northeast(N), North Central(C), West(W), South(S)
13 - Communication: Total Communication(T), Rochester(R), Oral(O)
14 - Deafness: Prelingual(P), Congenital(C)
15 - Parental Occupation: Professional(P), Managers(M), Craftsman(C), Operatives(O), Laborers(L)

16 - Residence: Rural(R), Urban(U)
17-18 - Parental Hearing Status: Hearing(H_, Deaf(D)
19-20 - Picture Completion (PC)
21-22 - Picture Arrangement (PA)
23-24 - Block Design (BD)
25-26 - Object Assembly (OA)
27-28 - Coding (CD)
29-31 - Performance IQ - PIQ

VITA

Steven Ray was born in Miami, Florida and spent much of his youth in Kingsport, Tennessee and North Little Rock, Arkansas. At the time of this study he was 34 years of age. He received his B.A. in Psychology from the University of Mississippi (1967), a M.S. in Special Education from The University of Tennessee (1978), and will receive the Doctor of Education degree, also, from The University of Tennessee, in December of 1979.

Mr. Ray worked for seven years, in the area of educational performance contracting, prior to entering The University of Tennessee. From 1977-1979, he was employed as a graduate assistant in the Department of Special Education and Rehabilitation where he aided in the development and presentation of workshops for the training of psychologists in the psycho-educational assessment of low-incidence handicapped children. Through these workshops he was presented his study, "An Adaptation of the 'Wechsler Intelligence Scales for Children-Revised' for the Deaf," to more than 600 psychologists in a seven state area. He has co-authored one paper for the Journal of Elementary Education.

As a member of several organizations for workers with the deaf and the Tennessee Association of Psychologists in the Schools, Mr. Ray has been involved in the assessment

and evaluation of handicapped children. He will be employed beginning September 1, 1979, as Director of the Northwest Regional Comprehensive Diagnostic Evaluation Center in Jasper, Alabama.