A COMPARISON OF RESULTS OF THE ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES AND CERTAIN OTHER TESTS USED IN EVALUATING CHILDREN WITH LEARNING DISABILITIES

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THESIS

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

MASTER OF ARTS

By

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Denton, Texas
June, 1970
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CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

How a child learns and the factors that influence his development are of major interest to both the educator and the clinician involved in remedial training. Berlin (4, p. ix) states that it is, "the capacity to learn from experience, the ability to use symbols, and the development of a spoken and written language," that makes it possible for the child to adjust to and communicate effectively with his environment. As described by Frost (15, p. 11), the development of language skills follows the sequence of listening with an ever-increasing degree of comprehension, communicating orally with clarity and meaning, reading with understanding, and the translation of thoughts into written symbols.

The attainment of these basic linguistic skills is an area that warrants further investigation. McCarthy (25, p. 492) states that, "The amazingly rapid acquisition of an extremely complex system of symbolic habits by young children is a phenomenon which has increasingly attracted the attention of child psychologists, as well as linguists, in recent years." McCarthy emphasized that, in order to understand the development of the basic linguistic skills, the relationship between language and thought must be pursued. She points out that
the processes of recognizing distinctions, formulating from the abstract, discerning shades of meaning, and communicating ideas are all part of the relationship of language, thought, and speech (25, pp. 493-494).

Continuing in the investigation of the relation of language, thought, and speech, Myklebust (28, p. 2) classifies language into three categories and states that all are necessary to useful communication. The first, inner language, is utilized to think or organize thoughts. Second, receptive language is concerned with receiving and interpreting information through linguistic symbols. Expressive language, the third, involves communicating one's thoughts and ideas into meaningful linguistic symbols. The integration of both inner and receptive language must precede the development of expressive language. The child learns to speak, and he learns to comprehend visual language before he learns to write.

Earlier than Myklebust, Vigotsky (42, p. 37) discussed what he termed external or vocalized speech, inner speech, and thought. He emphasized that unless there was an understanding of the psychological nature of speech, there would be no foundation on which to base the complex relation of thought to words.

To provide a foundation to explain the function of language, Osgood (31, pp. 76-77) submits a theoretical behavior model of psycholinguistics. The model is composed of two stages and three levels of organization. The first stage
involves the interpretation by the organism of physical energies in the environment and is called decoding. Encoding, the second stage, is the action of the organism expressing intentions which then become environmental events. The three levels of organization are between stimulus and response in the behavioral act and apply both to encoding and decoding. The first level, projection, relates receptor and muscle impulses via the neural mechanism to the brain. Integration, which is second, organizes and sequences neural events, both incoming and outgoing. Third, representation or cognition involves the termination of the decoding stage.

The acquisition of language skills is a necessary prerequisite for academic success. Bangs (2, pp. 2-3) reports that both educators and diagnosticians stress the importance of sensation, perception, memory-retrieval, attention, and integration as necessary avenues of learning. In the child's preschool and early school years, Bangs explains that the auditory channels are the child's primary source of knowledge. He is able to understand and appropriately use connected discourse by learning word meanings and the particular code of communication. Continued exposure to listening experiences enables the child to use this oral language to develop concepts, exert his own influence, and better prepare himself for formal education. Oral language has been defined by Carroll (8, p. 332) as a, "structured system of arbitrary vocal sounds and sequences of sounds which is used in
interpersonal communication and which rather exhaustively catalogs the things, events, and processes of human experience."

Bangs (2, pp. 2-3) continues by noting that as oral language skills become mastered, written language skills become the central focus of concentration in school. From the academic point of view, reading, writing, spelling, and arithmetic are included in written language. To avoid misinterpretation it should be noted that Bangs' use of the terms oral and written language skills include both the expressive and receptive processes.

Strickland (37, p. 319) points out that most children have mastered the basic skills of sentence types, inflectional forms, and the most important features of grammar by the time they are six years old. Refinement of sentence structure and grammatical usage, development of vocabulary, and the opportunity to use all of these skills are the main aspects of language development at this stage.

The child whose language development is below that which would be expected for his age, for whatever the reason, will probably be handicapped both socially and academically. Harris (18, p. v.) made the following statement.

Language is fundamental to the normal intellectual, social, and emotional development of children. Clinical evidence is overwhelming that children who, because of sensory defect, are unable to communicate do not grow normally in these respects. There is no question but that there is a reciprocal relation among these several areas, and that what we call
healthy personality development requires intercommunication of children with children as well as of children with adults.

The terms language disorder, language delay, and learning disability are frequently used and often appear to be used interchangeably. Bangs (2, p. 11) refers to "children who do not follow an orderly pattern when learning the language. . ." as language disordered. She defines language delayed as "those who do follow an orderly pattern but one not commensurate with chronological age. . . ." Bangs says that it is not always feasible to use these terms definitively in a clinical situation. Johnson and Myklebust (19, p. 18) define a learning disability as "a discrepancy between ability and achievement, between potential for learning and the level of learning obtained."

The child who exhibits a learning or language disability usually displays a constellation of disorders. McCarthy (25, pp. 602-603) suggests that the identification of the various syndromes that accompany language disorders would aid in understanding the influence language development has on total individual adjustment. Most information regarding language development has come from the study of those exhibiting problems in speech, reading, writing, spelling, or some other disorder involving delayed learning. McCarthy reports studies by Gaines and Yedinack in which they found that the various forms of language disorders, mentioned above, occur more in combinations in the same person than could be expected.
from chance. In agreement, Bateman (3) indicated that rarely does a child perform below his level of achievement in only one developmental area.

In discussing the interrelationships of various aspects of language development, Frost (15, pp. 12-13) mentions some studies by Hughes, Hildreth, Martin, Winter, and Loban that have revealed some rather interesting and contrasting facts. The results of these investigations of the interrelationships of oral language, reading, drawing, writing, and spelling, at the first and second grade levels, seemed to indicate that "each language variable followed an individual developmental pattern and was unrelated to other variables. "...each child's pattern of language development seemed to be unique."

Beginning at about the third grade, positive or high relations were found between health and general language ability, oral and written language, oral language and reading, and reading and written language. Johnson and Myklebust (19, p.17) point out that deficiencies in speech, reading, writing, and spelling are more commonly recognized and have received the most attention from parents and teachers because of their pertinence to academic success.

The relationship between language development and intelligence, reading skill, visual perception, and auditory discrimination will be of interest for this study. The opinions of a number of authors, clinicians, and researchers, concerning just how language development does relate to these four areas, will be discussed.
Bangs (2, p. 27) explains the interrelationship of intelligence and language in the following manner.

Operationally, intelligence may be defined as the capacity to solve problems through the integration and interdependence of two systems, language and learning. Children with deficits in one or more (but not all) avenues of learning are described as having specific learning disabilities. Children with deficits in language and all avenues of learning demonstrate general intellectual retardation. Theoretically, the child with no deficits in language or learning had adequate learning potential.

Bangs lists these "avenues of learning" as sensation, perception, memory-retrieval, attention, and integration. In addition, Bangs emphasized that proper motivation, social maturity, social perception, and emotional stability are all important in achieving both social and academic success.

In the 1950's McCarthy (25, p. 598) notes that the variations in intellectual differences that are observed from one individual to the next have been largely effected by language development. McCarthy points out that, thus far, a satisfactory intelligence test for age levels before the use of verbal language has not been developed, and acceptable intelligence tests are weighted heavily with verbal factors. These two facts would seem to stress the importance of language in mental development. Gardner (16, p. 182) stated that "during the later preschool years and in subsequent development throughout childhood, over-all language development is the best single index of intelligence available to psychologists."
It would seem obvious that a child must have mastered certain language skills before experiencing any success in reading. When the language delayed child reaches school age, McCarthy (25, p. 610) points out that he will be "... expected to acquire the secondary forms of language, namely reading and writing." With ever-increasing numbers, schools are faced with the poor reader of normal intelligence. The ability to "... quickly make associations between the printed symbol, the auditory symbol, and meaning," as described by Johnson and Myklebust (19, p. 148), is a skill that often eludes the language delayed child. Lefevre (22, p. 196) emphasizes the relation of reading to language development in the following statement.

... reading is first and foremost a language process. Any language process may best be studied integrally with the signaling system or code that transmits meaning. Reading depends on auding and speaking and is closely linked to writing; auding and speaking are audio-lingual processes, reading and writing are manual-visual, but all are language processes. Speaking and auding may be thought of as sending and receiving operations of audio-lingual communication; writing and reading as sending and receiving operations of communication—graphics.

In studies evaluating poor readers, Bateman (3, p. 53) generalized that deficits in auditory and visual memory (visual memory being more important) occurred quite commonly. Bangs (2, p. 17) listed building vocabulary level, retention of concepts, interpretation of facts, reaching correct inferences, and generalization from one idea as necessary language skills in reading achievement.
Language skills would appear to be closely associated with the efficiency of sensory input and perceptive mechanisms. The interaction of language with environment, as explained by Darley (10, p. 81), involves auditory, visual, tactile, olfactory, and gustatory sensations. Perception, the recognition and interpretation of what is sensed, is as important as the sensation. Wood (47, p. 18) stated that, "the interrelationship between perception and language suggests that anything which delays, distorts, disturbs, or retards perception will have a similar effect on language."

Kellogg (21, pp. 121-122) has divided auditory and visual perception into levels of acuity, discrimination, and comprehension. Discrimination, briefly described as distinguishing likenesses and differences, will be further investigated. Kellogg continues by assuming that if a child is able to understand and use both oral and visual symbols, there should not be a significant deficit. If, on the other hand, a disorder in the speech and/or language areas exists, perceptual skills should be assessed.

A diagnosis of language development, reading skill, intelligence, visual perception, and auditory discrimination should be included in any evaluation of a child suspected of having a learning disorder. In the following statement Luria (24, p. 11) emphasizes the importance of understanding and evaluating a child's communicative skills.

This whole process of the transmission of knowledge and the formation of concepts, which is the
basic way the adult influences the child, constitutes the central process of the child's intellectual development. If this information of the child's mental activity in the process of education is left out of consideration, it is impossible either to understand or to explain casually any of the facts of child psychology.

This statement would seem to indicate that the study of the child's mental processes, that result from his attempt to intercommunicate with environment by transmitting his experiences through the use of visual or spoken symbols, should be of primary importance in research.

When the terms study, research, evaluate, and diagnosis are used, the researcher must begin to think in terms of measurement. Wechsler (44, p. 9) says that it is necessary to assume that human capacities can be regarded as physical or psychophysical quantities, and these quantities can be submitted to measurement. Wechsler continues by pointing out that to the psychologist the term capacity becomes synonymous with ability and that "reference to an individual's capacity implies the degree to which that person possesses a given trait or ability, that is, some quantitative or qualitative judgement as to the excellence of a function or performance." Wechsler mentions memory, learning, and reasoning as intellectual capacities.

Bangs (1, p. 6) points out that the clinician who is expected to evaluate the child exhibiting signs of delayed language development must set up a procedure to obtain the information that will have the most value. Before the language
evaluation can proceed, the clinician should have available the case history and medical records. Information concerning hearing and visual acuity, mental retardation, and emotional disturbances are vital in reaching a diagnosis. From this point, a decision must be made as to the procedure that will be used in evaluating the child. How the clinician approaches evaluation is of prime importance. The techniques and instruments that have evolved to be used in evaluating or analyzing language development are largely the result of clinical experience.

Statement of the Problem

The purpose of this study is to determine whether or not the Illinois Test of Psycholinguistic Abilities (ITPA), including its subtests and total test scores, can be used reliably as predictors of achievement on other tests used in the diagnosis of language disorders in children. The tests selected for comparison are the Wechsler Intelligence Scale for Children (WISC), the Frostig Developmental Test of Visual Perception (FROSTIG), the Durrell Analysis of Reading Difficulty (DURRELL), and the Wepman Auditory Discrimination Test, Form A (WEPMAN). All five of these tests are well-established and frequently used tests in assessing various aspects of the language developmental level of children.

Each of these tests is designed to fulfill its own particular purpose. The DURRELL provides a series of reading situations that enable the examiner to make a detailed
observation, and it includes a range from non-readers to a sixth grade level. The subtests to be examined for comparison are oral reading, silent reading, listening, flash words, word analysis, spelling, visual memory, and sounds.

The WEPMAN does not require visual, speech, or reading ability, but it does require the child to make a decision concerning whether two words sound the same or different. The age range is five to eight years, and the score is in terms of adequate or inadequate auditory discrimination.

The FROSTIG is designed to measure visual perceptual development in children ranging in age from three to nine years. The subtests are figure-ground, form-constancy, position in space, eye-hand coordination, and spatial relationships. The DURRELL, WEPMAN, and FROSTIG are all quite commonly used in an over-all evaluation of reading skill.

The WISC is an instrument used by psychologists to assess intelligence as it has been defined by the designers of the test. Both the verbal and performance sections, as well as the full scale score, of the WISC will be examined for comparisons.

The ITPA is often used in speech clinics in evaluating the general language achievement of children ranging from two and one half to ten years of age. All of the subtests and the total test scores will be included in the comparisons.

Evaluating children with learning disorders usually involves the administration of a battery of tests. The ITPA,
WISC, FROSTIG, WEPMAN, and DURRELL are frequently used. The administration of these tests alone requires a number of hours, usually done in several sessions. It should further be emphasized that these tests comprise only part of the evaluation. In addition to the time factor, examination will reveal some grounds for similarity and comparison. Visual, auditory, motor, and vocal tasks involving comprehension, discrimination, perception, memory or recall, performance, association, sequencing, decoding, and encoding skills can be found in various combinations on the above mentioned tests.

It could prove to be beneficial to those testing children with learning disorders if generalizations and predictions could be made from the performance on subtest and total test scores of the ITPA to comparable subtest and total test scores on the WISC, FROSTIG, and DURRELL and total test score on the WEPMAN. The results of such comparisons should aid in determining whether or not the ITPA is providing the clinician with information that either supports or duplicates the results of the above four tests.

Review of the Literature

Cripe (9) conducted a study to determine if the learning and perceptual behavior of first grade children was related to selected subtests of the ITPA. Thirty-six children with normal auditory and visual acuity, normal articulation, and normal or above intelligence (using the Peabody Picture
Vocabulary Test and/or the Goodenough Draw-A-Man) were selected for the study. In addition each must have had at least one standard deviation on the auditory or visual decoding and/or the auditory or visual association subtests of the ITPA. Experimental tasks involving absolute identification of eight stimulus items were designed to allow comparison of performance on auditory and visual linguistic and nonlinguistic learning tasks. Comparison of the auditory and visual groups' rate of learning indicated essentially no difference. It was concluded that differences being measured by the ITPA were subtle, and discrepancies in a child's ability to learn auditory and visual stimuli are not measured by the ITPA.

Taylor (38) investigated whether or not scores from the ITPA could reliably be used as predictors of performance on visual motor tasks of the WISC and the FROSTIG with children with learning disorders. Thirty children were selected from the Pupil Appraisal Center of North Texas. The ages ranged from six to nine years old. Only the eye-hand coordination and spatial relationships subtests and the perceptual quotient scores of the FROSTIG were used. The visual motor association and visual motor sequencing subtests and the total test performance were the only scores of the ITPA used. On the WISC, the block design, object assembly, and coding subtests and the performance scores were used. No significant positive correlations were found among the three tests. Negative
correlations were found between the ITPA visual motor sub-
test and the FROSTIG eye-hand coordination subtest and be-
tween the WISC block design subtest and the FROSTIG total
test score. Negative correlations were also found between
the WISC coding subtest and all three subtests of the FROSTIG
and between the WISC object assembly subtest and the FROSTIG
eye-hand coordination subtest. These were not, however, sig-
nificant negative correlations.

Kass (20) attempted to discover some psychological cor-
relates of severe reading disability. The subjects were twenty-
one children between the ages of seven and ten with normal in-
telligence and no known auditory or visual defects but were
functioning from one-half to two and one-half years below their
grade level in reading. The ITPA, a visual automatic test, a
sound blending test, a maze test, a memory for designs test,
and a perceptual speed test were all given to the children.
The children appeared to be deficient on the auditory vocal
association and visual motor sequential subtests on the ITPA
and the visual automatic test. The results indicated that
these children with reading disabilities tended to have defi-
ciencies at the integrative level, which is closely related
to the acquisition of reading skill. Kass suggested that the
ITPA was somewhat incomplete in its' ability to measure all
of the facets of psycholinguistic functioning.

Butt (7) conducted an experiment to examine the relation-
ship of language and articulation ability to reading ability.
Fifty-nine third graders were selected and divided into three groups according to articulatory ability: normal, minor defect, and severe defect. Articulation was measured by the Templin-Darley Screening Test of Articulation. Each child was given the Peabody Picture Vocabulary Test, the ITPA, and the Gates-MacGintie Reading Test (GMRT). The results showed a lack of significant differences among the three groups. It should, however, be noted that the normal articulation group did score higher on the GMRT and earned higher correlations between the ITPA total score and the vocabulary and comprehension subtests of the GMRT. The severe articulation group was the only group in which not all the subtests correlated significantly with the total score on the ITPA.

Egeland (13) reported a study that investigated the relationships of intelligence, visual motor skills, and psycholinguistic abilities with achievement. The sample consisted of 117 randomly selected boys in the first grade. The tests used were the WISC, the Bender Gestalt, the ITPA, and the Metropolitan Achievement Test. Subtests used on the achievement test were word knowledge, word discrimination, reading, and arithmetic. The mean IQ established by the WISC was 112.8. The WISC, the Bender Gestalt, and the total ITPA score correlated significantly with achievement. The visual decoding, vocal encoding, and motor encoding subtests of the ITPA did not correlate with achievement. While the other six subtests of the ITPA made significant contributions, there was no trend
as to which subtests consistently predicted achievement in the various areas.

Smith and McWilliams (36) conducted a study to investigate the communication patterns of children with cleft palates. The subjects consisted of 136 children with cleft lips and/or cleft palates. There were eighty-six boys and fifty girls ranging in ages from three years to eight years and eleven months. The ITPA was administered to all of the children. The results showed that the children at each age level exhibited a general depression on all of the nine subtests. Consistent and substantial weaknesses were found on vocal and gestural expression and visual memory. Of particular significance, was the tendency for these children to perform progressively poorer in each of the language areas as their age increased. The authors felt that these children tend to withdraw from communicative activities as they grow older.

Dickson (11) attempted to determine if the ITPA would support a clinician's diagnosis of language delay in children with functional articulation defects. The subjects were enrolled in speech correction. There were ten boys and ten girls, with a mean age of seven years and four months. All twenty children were judged to have functional articulation defects, but only half were judged to be language delayed. The children judged to be language delayed scored significantly lower on the total test score and on eight of the nine subtests on the ITPA than did those children judged not to be language delayed.
Weaver and Weaver (43) were concerned with the psycholinguistic abilities of culturally deprived Negro children. The ITPA was administered to a group of culturally deprived Negro children. The profiles were compared to a control group and a group of educable and trainable children previously studied. A definite similarity was found with the profiles of the educable and trainable children, showing a greater difficulty in utilizing auditory and vocal channels than with visual and motor channels. The control group was significantly higher than the experimental group on total ITPA language scores. Although high positive correlations were found between language and mental age, language age was significantly lower.

In a study of mental retardates conducted by Milgram (26), 240 institutionalized retardates were given the WISC vocabulary, the automatic and the association subtests of the ITPA, and the Peabody Picture Vocabulary Test (PPVT). While all scores were highly correlated, the mental age score and intercorrelation between the WISC and the PPVT were significantly higher than with the subtests on the ITPA. The author discussed the retardates' expressive linguistic disorders in terms of minimal reinforcement and stimulation of language patterns.

Olson (30) conducted a study to try to determine the predictive value of the FROSTIG on general achievement in the second grade and the relationships among FROSTIG test scores and estimates of specific reading ability. Seventy-one second
grade children were chosen for this study. The children were
given the following tests: the FROSTIG, the California Achieve-
ment Test (CAT), the 1963 revision of the California Shortform
Test of Mental Maturity (CTMM), the Gates Advanced Primary
Reading Test (GATES), and the hearing sounds in words subtest
(primary) and the visual memory of words subtest (primary)
from the DURRELL. A recognition of reversible words in con-
text test and a word synthesis test were also constructed and
administered. The results showed that while the FROSTIG does
have some predictive value of general achievement in the sec-
ond grade, it does not predict as well as the hearing sounds
in words and visual memory for words subtests on the DURRELL,
reversible words in context and synthesizing words in context,
or the GATES paragraph reading and word recognition subtests.
Only the form constancy subtest on the FROSTIG did not corre-
late significantly with the CAT or show significant relation-
ships with specific reading abilities.

A study to investigate the similarities among several
reading readiness tests and the FROSTIG was conducted by
Ohnmacht and Olson (29). The subjects were 232 first grade
children with a mean verbal IQ of 92.4. During the first
month of school the children were given the Metropolitan Read-
ing Readiness Test (MRRT) and the Gates Reading Readiness Test
(GRRT) by their classroom teacher. During the same period,
trained administrators gave the FROSTIG. Correlations among
all subtests were computed. All of the correlations were
significant at the .01 level. The results showed that both the MRRT and the GRRT reflect a substantial amount of information revealed by the FROSTIG. The authors felt that such similarity would seem to indicate that the FROSTIG results in a degree of redundant information that might be termed perceptual readiness.

The effect of age, sex, and language on a visual motor task involving rotation was studied by Blum and Chagnon (5). The 480 subjects ranged in age from six years to fourteen years and six months. The children were placed in one of four groups, depending upon their language level. The Minnesota Percepto-Diagnostic Test, a test that measures rotation, was administered to each child. Results showed that the degree of rotation evident in the subject's reproduction of the designs was significantly affected by differences in language and age. Maturation, which was represented by increasing age, did appear to lead to greater perceptual differentiation. This perceptual differentiation involved perceiving the design independent of its background field.

Tjossem, Hansen, and Ripley (40) set up a study to investigate reading difficulties in young children of normal intelligence. The subjects, twenty-four children with a mean age of eight years and ten months, were referred on the basis of their normal intelligence and serious difficulty in reading. Using the WISC, a mean full scale IQ of 104 was established. Reading achievement was determined by the Wide Range Achievement
Test and the Gray's Oral Reading Paragraph Test. In the following sessions, the Embedded Figures Test, Kinesthetic Mazes Test, Reversible Figures Test, Picture Perception Test, and several dominance tests were administered. It was found that, in these children of normal intelligence, skills of visual perception appear more closely associated with reading success than intelligence. Results further showed, however, that low scores on the digit memory span and coding subtests of the WISC appear as possible indicators of reading difficulty.

Bryan (6) was concerned with the importance of intelligence and visual perception in the predicting of reading achievement. There were four grade levels examined in this study, which included the following: twenty-three kindergarten, twenty-five first grade, twenty-two second grade, and twenty-one third grade children. The Kuhlman-Anderson Intelligence Test and the California Achievement Test were administered to the first, second, and third graders. The Metropolitan Reading Readiness Test was administered to kindergarten and first graders. The FROSTIG was administered to all of the children. Results seemed to indicate that visual perception appears to have relatively more weight than intelligence and reading readiness in predicting reading success in the first grade. In the second grade, visual perception correlated more highly with reading comprehension, and intelligence correlated more highly with reading vocabulary. It appeared that intelligence
was a better predictor of reading success in the third grade for both reading vocabulary and reading comprehension. Conclusions suggested the need for testing of visual perception (intelligence and reading tests usually given) at the kindergarten and primary levels.

A study was conducted by Reed (34) to observe reading achievement as it is related to differences between verbal and performance IQ's on the WISC. The subjects consisted of 248 first graders and 233 fifth graders. All children were administered the WISC. First graders were given the Gates Primary Paragraph Recognition Test. The fifth graders were given the comprehension section of the Gates Diagnostic Survey Test. At each of the two age levels three groups were formed. Group I consisted of those children with high verbal and low performance ability. Group II was just the opposite of Group I. Group III showed about the same ability in both verbal and performance skills. Such grouping was predicted to show the effect of low verbal abilities on reading achievement. The use of the two age levels was to see if the relation of the WISC profile to reading achievement is constant at different chronological age levels and reading maturity levels. The results revealed that kind of intelligence, rather than level alone, was related to reading achievement among older children but not among younger children. There was no evidence to show that, at either age level, the retarded reader's "intellectual pattern" could be used to identify reading problems. The
older age group did show a relationship between fluent reading skill and high verbal skill, but retarded readers could not necessarily be attributed to low verbal skill. At the younger level, differences between verbal and performance skills did not appear to be reliable.

Werner, Simonian, and Smith (46) investigated the relationship of reading achievement, language functioning, and perceptual motor development. The subjects were 750 children ranging in age from ten to eleven years old. The sample was stated as representing 90 per cent of all the children born on Kauai, Hawaii, in 1955. It was found that the percentage of reading problems was one of six in the above average socio-economic status group and one of two in the below average socio-economic status group. In the lower socio-economic group it was noted that Pidgin English was frequently spoken in the home. Children with reading problems scored significantly lower on all Primary Mental Abilities scores than did successful readers. Increased errors on the group Bender-Gestalt coincided with reading problems, but it should be pointed out that the majority of the children with reading problems performed adequately on the Bender-Gestalt. Most children who did poorly on the Bender-Gestalt were found to have low or below average intelligence.

Robeck (35) conducted a study to test the null hypothesis that problem readers would show no distinctive subtest patterning on the WISC. The thirty-six subjects came from
the Reading Clinic at the University of California and included an age range of six years and eleven months to thirteen years and nine months. Because different tests had been used, reading achievement scores were not comparable. On the WISC there was a full scale IQ range of 85 to 136. Subtest scoring on the WISC showed the problem readers rating significantly higher than Wechsler's population sample on comprehension, block design, comparison, picture completion, vocabulary, and object assembly. The reading disability group showed significant weaknesses on the digit span, arithmetic, information, and coding subtests.

In a study conducted by Muehl and Kremenak (27), the purpose was to determine the relation between prereaders' abilities to integrate sensory information and reading achievement. One-hundred and eight first graders were selected, all of whom had been given the Harrison-Stroud Reading Readiness Profiles and the Lorge-Thorndike Intelligence Test. The children were then involved in an experiment that required matching various combinations of visual and auditory patterns. The results showed that the matching of auditory pairs was more difficult than the matching of visual pairs for these first graders. When extreme reading groups (based on end of the year tests) were equated on IQ, the results showed that ability to match auditory to visual and visual to auditory pairs was a significant indication of predicted reading achievement. Ability to match visual pairs did not contribute to predicting reading
achievement. Muehl and Kremenak note that, in contrast to previous studies conducted by Goetsinger, Dirks, and Baer and Wepman, ability to match auditory pairs gave no indication of reading achievement. The ability to name letters (subtest of reading readiness test) made the greatest contribution toward predicting reading achievement.

Rechner and Wilson (33) investigated speech sound discrimination and its relation to auditory vocal subtests of the ITPA. The subjects were forty first graders with average IQ's and normal hearing. These forty subjects were selected after the Templin Speech Sound Discrimination Test was given to 421 children. Those children ranking in the top or bottom twenty per cent of the discrimination results were selected. The subjects were then given the Templin-Darley Test of Articulation and the auditory vocal subtests of the ITPA. Results indicated that the discrimination scores had a significant effect on ITPA subtest scores. Regardless of articulatory skill, children with adequate discrimination performed better on the ITPA subtests than children with deviant discrimination. All subjects performed significantly lower on the auditory memory subtest than on the auditory vocal automatic (grammatical closure). The effect of interaction of discrimination and articulation on the ITPA subtest scores was negligible.

Thompson (39) was concerned with determining a relation with auditory discrimination and intelligence test scores to success in primary reading. Of secondary concern was 1) if
the auditory discriminative ability improved during the first and second grades and 2) to determine whether poor readers established a pattern on the twelve subtests on the WISC which was significantly different from good readers. This was a longitudinal study, from September, 1958, to May, 1960. All entering first graders were tested. One-hundred and five children were tested at the end of the second grade. Three tests of auditory discrimination were used: WEPMAN- Form A, Boston University Speech Sound Discrimination Picture Test, and the auditory discrimination and orientation subtests of the SRA Reading Analysis: Aptitude, Form A. A composite auditory discrimination score was then used in the study. The WISC was administered for an intelligence measure. The Gates Advanced Primary Reading Test, word recognition and paragraph reading subtests, was given during the eighth and ninth months of the second grade. The results indicate that auditory discrimination and intelligence are highly correlated with success in primary reading. Auditory discrimination ability tended to improve more in poor readers than in good readers. The WISC was not highly prognostic in determining who will or will not achieve a reading ability above his mental age. The poor readers' verbal score on the WISC was lower than the performance score.

Wepman (45) conducted a study to determine the relationship between auditory discrimination, articulation, intelligence, and reading achievement. The subjects consisted of
eighty first graders and seventy-six second graders. At the end of the school year the children were given the Auditory Discrimination Test, the Speech and Language Clinics' Articulation Test, the Chicago Reading Tests, and the Kuhlmann-Anderson Intelligence Test. The children were then divided into three groups on the basis of their auditory discrimination and articulation scores. Group I included children whose scores were adequate for their age. The children in Group II had adequate articulation but inadequate auditory discrimination for their age. The children in Group III showed inadequate articulation and adequate auditory discrimination for their age. The results showed that, regardless of articulation skills, those children with poor auditory discrimination were more likely to be poor readers than the total group. While there was a positive relation between low speech and reading scores and intelligence, it was not statistically significant. Auditory discrimination scores showed an increase from first to second grade. The reading attainment level for children with poor auditory discrimination was significantly lower than the other children. The second graders with good articulation, but poor auditory discrimination, showed a lower intelligence quotient than the other children, but their IQ was still within normal limits.

Dykstra (12) conducted a study to determine the relationship between auditory discrimination and reading achievement. His subjects were 632 first grade children. Auditory
discrimination skill was determined at the first of the year by using subtests of several reading readiness tests. Intelligence was measured by the Lorge-Thorndike Intelligence Test. Reading achievement was tested at the end of the year by the Gates Primary Reading Test. As a group, auditory discrimination and intelligence were significantly related to reading achievement. Individually, however, the relationship was not clear. In addition, it was found that readiness tests supposedly testing the same auditory discrimination skill did not always agree too well.

Haring and Ridgway (17) explored the area of early identification of learning disabilities in children. The subjects consisted of over 1200 children enrolled in kindergarten. The objective observations of the kindergarten teachers served as the screening method for potential learning disorders. Points for evaluation included motor coordination, verbal fluency, speech development, auditory and visual memory, auditory and visual discrimination, visual motor performance, directionality, and laterality. Results indicated that kindergarten teachers can successfully identify children with developmental language delay if they are provided with structured guide lines for specific performance areas.

Vernon (41) investigated the relationship of verbal language to the thought process by the combined examination of thirty-three previously published research studies. This investigation included a total of over 8000 subjects. In all
of these studies the level of verbal language was carefully manipulated while the thought process was being measured. The results indicated three possible conclusions. First, there is no functional relationship between cognition or the thought process and verbal language. Second, verbal language is not the mediating symbol system of thought. The third conclusion could be that there is no relationship between concept formation and level of verbal language development.

Lovell and Dixon (23) explored the growth of grammar control in what they termed educationally subnormal children. There were 100 children from two to six years of age and eighty children from six to seven years of age. All of the children were enrolled in special education classes. The Imitation, Comprehension, and Production Test was administered to all of the children. At all of the age levels and in both groups imitation was found to be more advanced than comprehension, and comprehension was found to be more advanced than production in the control of grammar. The rank difficulty of the items remained constant across various tasks, age levels, and when compared with normal children. The authors feel that their findings support Piaget's view regarding the relationship between language and thought.

Preston and Gardner (32) composed a study to determine the relation between oral and written language fluency and various personality and ability measures. The subjects were fifty female and forty-five male students enrolled in an
introductory psychology course. A written theme and an oral language sample was obtained on seventy-two of the subjects. Results showed the following relationships: written language diversity was related to associational fluency; speech diversity was related to vocabulary knowledge; word production in oral and written language was related to vocabulary knowledge; social approval was related to the used of long pauses; and associational fluency was negatively related to the occurrence of speech intrusions.

A study conducted by Fodor (14) was undertaken to determine the influence story telling had on the language development of small children. The subjects used in this study were between twenty-one and thirty months and came from low income, urban families. The children were divided into two groups of twenty-four each. Each group was read to from illustrated children's story books for twenty minutes a day, five days a week, for a period of three months. The first group had the stories read to them exactly as they were written in the book. The second group had the reading supplemented by frequent explanations and word-referent associations. In addition, the children in the second group were encouraged to use their expressive language. Initial and final language tests were administered and later compared. Results indicated that the children in the second group showed a significantly greater vocabulary growth than the children in the first group. There was, however, no differences found in the length of expression.
Summary and Preview

A thorough evaluation of a child suspected of having a learning disability should include an assessment of language development, reading skill, intelligence, visual perception, and auditory discrimination. The majority of the studies just reviewed found that children with learning disorders usually exhibit an interrelationship of the various aspects of language development.

The ITPA, WISC, FROSTIG, WEPMAN, and DURRELL are frequently some of the tests used in evaluating children with learning disorders. Such evaluations are time consuming, and examination has revealed that there are grounds for similarity and comparison.

The following study will attempt to determine if there are any significant correlations to be found between the total and subtests scores of the ITPA and the total and subtests scores of the WISC, FROSTIG, WEPMAN, and DURRELL. Such information should indicate if the ITPA is duplicating the above four tests or contributing additional diagnostic information.
CHAPTER BIBLIOGRAPHY


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CHAPTER II

STATEMENT OF THE PROBLEM

It is the purpose of this study to determine whether or not the total and subtests scores of the ITPA can be used reliably as predictors of achievement on other tests that are commonly used in evaluating children suspected of having a language disorder. The WISC, FROSTIG, WEPMAN, and DURRELL were selected for comparison.

As these five tests usually comprise only part of a battery of tests, a complete language evaluation can be quite time consuming. A correlation study between the total and subtests scores of the ITPA and the total and subtests scores of the WISC, FROSTIG, WEPMAN, and DURRELL should indicate whether or not the ITPA is duplicating or supporting the above tests or contributing additional diagnostic information. If significantly high correlations were found between total and subtests scores on the ITPA and comparable total and subtests scores on the WISC, FROSTIG, WEPMAN, and DURRELL, generalizations and predictions could be made from performance on the ITPA.
Procedure

The files of children referred to the Pupil Appraisal Center of North Texas (PAC) for evaluation of general learning disorders were the source of information for this study. PAC is primarily concerned with, "the identification, possible correction, and prevention of severe learning disabilities and disorders specifically related to reading difficulty, personal adjustment, and speech and hearing problems (12, p. 16)."
The center serves only those children referred from regular classrooms in the public schools of Denton, County, Texas.

All of the files, beginning with the fall of 1968, were examined. To meet the requirements of this study a child must, at the time of his evaluation by PAC, be between the ages of six and ten years and have on file the results of the initial diagnostic evaluations of either the first or the revised edition of the ITPA, the WISC, FROSTIG, DURRELL, and WEPMAN.

The administration of all the various tests was conducted by qualified individuals. A faculty instructor or a graduate assistant, supervised by a member of the faculty, conducted the administration of tests pertinent to his specialty area. Before conducting a test on the children at PAC, each test administrator was judged by his supervisor as qualified to give tests in his specialty area. The administration, scoring, and interpretation of each test was followed with strict adherence to the procedures specified by the author of the test.
Supervised graduate assistants at the Speech and Hearing Clinic administered the ITPA. The first edition of the ITPA was used with all of the children assessed until June 1, 1968. The WEPMAN, the DURRELL, and the FROSTIG were given by a reading specialist or a doctoral student in Education. A staff psychologist or a doctoral student in Guidance and Counseling administered the WISC. All examiners were graduate students or instructors at North Texas State University in Denton, Texas.

Subjects

From the population of children referred to PAC for evaluation of learning disorders, a total of fifty-four children fell within the age range of six to ten years, at the time of PAC's evaluation, and had been administered the ITPA (either edition), the WISC, FROSTIG, DURRELL, and WEPMAN. The minimum age of six years was set to eliminate preschool children. The maximum age of ten years was set in order not to exceed the scoring limits of the ITPA. Seventeen children had been administered the 1968 revision of the ITPA, and thirty-seven had been administered the first 1961 edition of the ITPA. The ages of the children ranged from seven years and one month to ten years and one month, with a mean age of eight years and six months.

All of these children were enrolled in regular classrooms in the Denton County Public Schools. As measured by the WISC, forty-three of the fifty-four children's intelligence
quotients ranged from 90 to 133, with a mean of 105. It should be pointed out that the remaining eleven subjects, while enrolled in a regular classroom, showed intelligence quotients ranging from 62 to 84, with a mean of 78.

Each child was evaluated in terms of auditory and visual tests of acuity and observation of motor skills. From the results of such tests and observation, it was determined that none of the children included in this study were handicapped by severe auditory, visual, or motoric defects which would interfere with or limit their ability to learn.

Tests

The 1961 Illinois Test of Psycholinguistic Abilities

According to Kirk and McCarthy (6), the 1961 edition of the ITPA is a result of their attempt to develop a psycholinguistic psychometric instrument for young children. The test is based on a rather comprehensive theoretical model of the communication process formulated by Osgood and described in Chapter I. Clinical experience and observation did result in the necessity of expanding Osgood's model to include, for example, the memory component. McCarthy and Kirk (11) developed a battery of nine subtests for the purpose of delineating psycholinguistic assets and deficits in children as young as two and one-half years old and extending to nine year old children.
Kirk and McCarthy (6) and McCarthy and Kirk (11) explain that the clinical model for the ITPA includes three dimensions. These dimensions are described as channels of communication, psycholinguistic processes, and levels of organization. First, channels of communication include various combinations of stimulus input and response output. The main channels are auditory, visual, and tactual for input and motor and vocal for output. On decoding tasks the visual and auditory channels of input are regarded as significant to language behavior. On encoding tasks the vocal and motor channels of output are considered the most important for language usage.

Psycholinguistic processes, the second dimension, involve the acquisition and use of learned abilities for language usage. The three main abilities to be considered are decoding, association, and encoding. Decoding is defined as the abilities required to obtain meaning from visual and auditory linguistic stimuli. Association is the ability required to manipulate linguistic symbols internally. Encoding is the sum of those abilities necessary in the expression of ideas with words or gestures.

The third dimension, levels of organization, refers to the functional complexity of the organism. When communicating, the necessary degree of language organization can be divided into two levels. The automatic-sequential level, sometimes referred to as the predictive function, encompasses
such activities as sequencing and response chains, closure and perceptual speed, and prediction based on past experiences. The representational, or meaning level, is demonstrated in activities that require the attachment of meaning or significance to auditory or visual symbols.

Six subtests of the ITPA make up the representational level, and three subtests complete the automatic-sequential level. Tests at the representational level assess the use of encoding, decoding, and association abilities in dealing with linguistic symbols. Tests at the automatic-sequential level involve non-meaningful use of symbols, mainly long-term retention and short-term memory of symbol sequences.

Beginning at the representational level, there are two subtests involving comprehension of spoken words, written words, and pictures. Decoding is the skill being measured. The auditory decoding subtest is a controlled vocabulary test requiring only a yes or no response. The visual decoding sub-test involves the selection of a perceptually similar picture.

Association is the ability to relate visual or auditory symbols in a meaningful way, and there are two subtests involving this skill. The auditory vocal association subtest requires the use of an analogous word to complete the test statement. The visual motor association subtest requires that a stimulus picture be related in a meaningful way with one of four pictures displayed.
Encoding is the ability to translate ideas into words or gestures. There are two subtests involving the encoding ability. On the vocal encoding subtest an object, held in the hand, must be verbally described. The motor encoding subtest requires a manual demonstration of the use of both objects and pictures of objects.

The three tests at the automatic-sequential level are not subdivided into decoding, encoding, and association. Automatic, in this instance, refers to the over-learned or automatic handling of the syntactical and inflectional aspects of language without conscious effort. Such familiarity allows one to predict or anticipate what is to be read or said from what has already been seen or heard. The auditory vocal automatic subtest requires the completion of a statement with an inflected word. Sequencing, as used here, is the ability to correctly reproduce a sequence of symbols. There are two subtests involving sequential memory. The auditory vocal sequencing subtest requires correct repetition of a series of numbers. The visual motor sequencing subtest involves the correct placement of a series of geometric chips after a timed presentation.

The ITPA is administered individually. There is no time limit, but it usually takes from forty-five minutes to an hour to administer. The raw score earned on each subtest and the total score can be computed to standard score norms and language age by using tables in the examiner's manual.
Using the population from Decatur, Illinois, the ITPA was standardized on over 1000 randomly selected linguistically normal children between the ages of two and nine. Seven hundred children were finally included in the standardization sample, having met the following criteria: an intelligence score between 80 and 120 on the 1937 revision of the Stanford-Binet was required; no Negro children were included in the sample; children with serious sensory or physical handicaps were not selected; the population was required to fit into one of the three occupational categories listed in the 1950 United States census; and preschoolers were not selected from day care centers or nursery schools. Fourteen age groups, from two and one-half and including nine year olds, were spaced at half-year intervals. An equal number of boys and girls was used (11, pp. 14-16).

The reliability of the ITPA was computed by consistency reliability and stability reliability. Since each subtest of the ITPA is designed to assess a specific psychological factor, an internal consistency reliability check would determine the homogeneity of the items within the test. The overall internal consistency coefficients ranged from .89 to .95. A stability reliability check was determined by the test-retest method and the split-half technique. The test-retest reliability method was conducted on sixty-nine children from the six to six years and six months age group, after a three month interval. Restricted stability coefficients for the nine
subtests ranged from .18 to .86, and the coefficient for the total score was .70. The coefficients for the full range estimates ranged from .73 to .96 for the nine subtests, with a total coefficient of .97. The coauthors emphasized that since these were minimal estimates due to the long test-retest interval and the restricted age range, stability is as good as or better than the data indicates. The split-half reliability coefficients were deprived using the entire age range. The overall split-half reliability coefficients for all nine subtests ranged from .90 to .96, with a total coefficient of .99 (11, p. 28-33).

Validity studies on the ITPA (11, p. 60) investigating the relationship between each subtest and total test score revealed an intercorrelation range of .82 to .95. Comparison of chronological age with each subtest and total test score revealed an intercorrelation range of .77 to .91, with a .94 for the total. Comparison of mental age with each subtest and total test score showed an intercorrelation range of .80 to .92, with a .95 for the total. McCarthy and Olson (11, pp. 66-67) state that it is difficult to make a definite judgement on the validity of the ITPA. Validity varies according to what aspect of the test is being considered. Concurrent, construct, and predictive validities appear to be adequate, followed by content and diagnostic validities. The authors suggest that further study would seem to be indicated.
The 1968 Illinois Test of Psycholinguistic Abilities

The 1968 edition of the ITPA (7) has some additions and changes that should be mentioned. One new subtest and two optional supplementary tests have been added. The new subtest, visual closure, involves the visual motor automatic function and requires identification of a common object from an incomplete visual presentation. The two supplementary tests involve the auditory vocal automatic function which refers to the ability to predict future linguistic events from past experience. The auditory closure test requires the missing parts of a word, presented orally, to be supplied. The sound blending test involves presenting, orally, a word divided into its individual phonetic elements. The word must then be spoken as a unit. The test progresses from a word with a picture, to a word without a picture, and finally to nonsense words.

Changes from the 1961 to the 1968 ITPA include a new terminology, new norms, changes in format and content, and more commonplace labels. The subtest name changes include the following: auditory decoding to auditory reception; visual decoding to visual reception; auditory vocal association to auditory association; visual motor association to visual association; vocal encoding to verbal expression; motor encoding to manual expression; auditory vocal automatic to grammatical closure; auditory vocal sequencing to auditory memory; and visual motor sequencing to visual memory.
About fifteen more minutes is needed to give the new edition than was needed for the first edition of the ITPA. On either edition of the ITPA, the length of time required to administer the test could be a factor in contributing to fatigue. Many children become quite restless after about forty minutes of testing time. A skilled test administrator will usually have a minimal problem with fatigue and restlessness on the part of the child. Changes in format and content have simplified administration, reduced objects to manipulate, and provided a smaller package.

Norms for the 1968 ITPA are derived from the responses of 1000 average children between the ages of two and ten. These children were rated average on measures of intelligence, school achievement, socio-economic status, and motor and sensory development. It should be pointed out that the ten year old age maximum is an extension of one year more than the 1961 ITPA.

From the raw scores on the 1968 ITPA, the following three types of norms are computed: the psycholinguistic age norms for each subtest; the composite psycholinguistic age norm; and the scaled score for each subtest and total test score. Scaled scores consider both group and mean variances and provide a more versatile means of computing performance from subtest to subtest and from child to child than do the psycholinguistic age scores.
The Frostig Developmental Test of Visual Perception

Frostig, Lefever, and Whittlesey (4, p. 160) point out that between preschool and the second grade two psychological functions, language and visual perception, are generally regarded as sensitive indicators of the functioning of the central developmental processes. An evaluation of a child's perceptual functions from preschool through early school years could prove to be of value to the teacher, psychologist, and the physician.

Preliminary construction of the FROSTIG was begun in 1958; the most recent standardization was accomplished in 1963. Children referred to the Marianne Frostig School of Educational Therapy, because of learning difficulties, provided the necessary experimentation and observation for the construction of the FROSTIG. Frostig was concerned with measuring and establishing the age at which certain operationally defined perceptual functions normally develop. For several reasons, Frostig elected to study the development of eye-hand coordination, figure ground perception, form constancy, position in space, and spatial relationships. Although these five abilities appear to develop independently of one another, there does seem to be a relationship between these functions and the child's ability to adjust and learn, and school performance appears influenced by these abilities (9, pp. 463-464).

The FROSTIG poses tasks, increasing in difficulty, in five areas of visual perception. Eye-hand coordination,
Test I, involves drawing lines within certain boundaries and connecting points. Test II is figure ground and requires the perception of intersecting and hidden geometric figures. Test III is form constancy and involves recognition of geometric figures in a variety of sizes, shadings, textures, and positions and discrimination from similar geometric figures. Test IV, position in space, requires discrimination of reversals and rotations of schematic figures. Test V is spatial relationships and involves copying patterns of various lengths and angles by connecting dots (3, pp. 385-386).

In the five areas of visual perception tested by the authors, strong evidence of age progression was present from three years of age up to about seven and one-half years. From age seven and one-half, the cognitive functions predominated. The authors suggested that the FROSTIG should prove a useful tool for screening groups of nursery school, kindergarten, and first grade children. They further stated that it should also be valuable as a diagnostic tool in evaluating older children with learning disorders (9, p. 467). When administered by a person who is competent to use it, the test should take less than an hour for a group and from thirty to forty-five minutes when given individually.

The scoring of the FROSTIG is objective and requires about five to ten minutes. The child's raw score for each sub-test is converted to a perceptual age level equivalent, the age at which the average child attains the same score. Scale
scores are obtained by dividing chronological age into perceptual age, multiplying by ten, and adjusting to the nearest whole number. A perceptual quotient, determined in a similar manner to an intelligence quotient, is a deviation score obtained from the sum of the subtest scale scores after correction for age variation (9, pp. 469-471).

The 1963 standardization of the FROSTIG was based on the response of 2100 nursery school and public school children between the ages of three and nine years. The entire test population came from Southern California. A weakness noted by the authors was that, geographically and socio-economically, the population sample was too restrictive, with the middle class status dominating. The grouping consisted of 107 children at each one-half year level.

For a reliability check, test-retest reliability coefficients were computed for fifty children attending the Marianne Frostig School for Educational Therapy. The time interval between tests was approximately three weeks. The average reliability coefficients was .80 for the subtests. The coefficient of retest reliability based on total scores was .98, using the full range in ages (3, pp. 387-388). Using thirty-five first and thirty-seven second graders, in another test-retest reliability study, perceptual quotient correlations were reported as .80 for the entire sample. Test-retest correlations for subtest scale scores ranged from .42 to .80 (1, p. 857).
Validity of the FROSTIG has been explored through an investigation of correlations between scale scores and teacher ratings. The correlations between scale scores and teachers' ratings were .44 for classroom adjustment, .50 for motor coordination, and .50 for intellectual functioning. Correlations between the Goodenough Draw-a-Man Test and the FROSTIG ranged from .32 to .46.

The Wechsler Intelligence Scale for Children

The WISC, which was published in 1949, extended the well-known Wechsler Intelligence Scale for Adolescents and Adults to a range of five to fifteen years of age. Originally, the WISC was patterned after the Wechsler Bellevue Intelligence Scale, and now it has its own short forms and foreign language versions. The WISC has been examined extensively and is widely used by both schools and clinics where individual measures of intelligence are necessary (8, p. 2).

The WISC's two areas of concentration are verbal and performance. Each major area is divided into five subtests and one supplementary test, comprising twelve subtests in the entire battery. The two supplementary tests are not routinely administered.

Information, the first subtest in the verbal section, requires the answering of questions that relay on information gained from experience. Comprehension involves making a practical judgement, or anticipating or judging consequences in a given situation. Arithmetic requires concentration and
arithmetic reasoning, using specific school learning to solve a problem. The similarities subtest taps the ability to recognize and describe essential relations between objects and ideas or verbal concepts. The vocabulary subtest reflects cultural environment, potentiality for dealing with symbols, and character of thought process. Digit span, a supplementary test, requires the repetition of digits which involves attention and auditory memory and sequencing.

The first subtest in the performance section of the WISC, picture completion, involves visual alertness and contact with reality in supplying the missing part of a picture. The picture arrangement subtest tests nonverbal judgement, anticipation, and synthesizing into intelligible wholes by the arrangement of puzzles and sequence pictures. The next subtest, block design, accesses logical insight into spatial relationships, visual motor perception and coordination, and analysis of the abstract by requiring the reproduction of two dimensional multicolored block designs. Object assembly requires a demonstration of visual motor coordination, appraisal to small detail, and seeing a relation of parts to a whole by recognizing four disassembled objects. The coding subtest involves copying and matching numerals and shapes and requires speed of visual motor reaction and association and the ability to learn an unfamiliar task. The supplementary test, mazes, requires foresight, planning, and following a visual pattern and visual motor control (5, pp. 36-104).
Wechsler's intelligence quotient replaces the mental age concept. The intelligence quotient is a result of evaluating the performance of each individual on the basis of scores of a sample population of his own chronological age. The scale scores of each subtest, which have a mean of 10 and a standard deviation of 3 for each age level, are converted from raw scores. A performance scale score and a verbal scale score are the result of summing the subtests under each respective area. The full scale score is the sum of the performance and verbal scale scores. The intelligence quotient scales at each age have a mean of 100 and a standard deviation of 15 (7, p. 3).

Standardization of the WISC was conducted on a total sample of 2200 children. Grouping included one hundred white boys and girls at eleven age levels, from five to fifteen years old. The population met certain sampling requirements based on the United States Census Bureau data for 1940. The population sample came from four geographic areas of the United States, was slightly more urban than rural, and represented nine occupational categories (5, pp. 7-9).

Each subtest of the WISC was correlated to verbal score, and these three composite scores were computed for correlations. Results were charted for the seven and one-half, ten and one-half, and thirteen and one-half age levels. At the seven and one-half year old age level the correlation of verbal to full scale score was .90, performance to full scale score was .89,
and performance to verbal scale score was .60. At the ten and one-half year old age level the correlation of verbal to full scale score was .93, performance to full scale score was .90, and performance to verbal scale score was .68. At the thirteen and one-half year old age level the correlation of verbal to full scale score was .89, performance to full scale score was .87, and performance to verbal scale score was .56 (14, pp. 9-12).

Reliability coefficients for the WISC were computed by the split-half technique, with the appropriate correction for full length of the test being adjusted by the Spearman-Brown formula. At the seven and one-half year old age level subtest reliability ranged from .59 to .77 for the verbal and .59 to .79 for the performance score. The composite reliability scores were .88 for verbal, .86 for performance, and .92 for full scale score. At the ten and one-half year old age level subtest reliability ranged from .59 to .91 for the verbal score and .63 to .87 for the performance score. The composite reliability scores were .96 for verbal, .89 for performance, and .95 for full scale score. At the thirteen and one-half year old age level subtest reliability ranged from .50 to .90 for the verbal score and from .68 to .88 for the performance score. The composite reliability scores were .96 for verbal score, .90 for performance score, and .94 for full scale score (14, p. 13).
The Durrell Analysis of Reading Difficulties

The DURRELL was first published in 1937 and was later revised in 1955. It is designed primarily for the observation and recording of faulty reading habits and areas of weakness. The desired result of this test is to use the reading errors as a guide to devising a remedial program. Durrell emphasized that the check list of errors that is compiled during the test by the examiner is more important than the norms for the test (2, p. 32).

In a description of the DURRELL by Spache (13, pp. 758-759), he noted that the test was designed to observe reading performance ranging from the nonreader to the sixth grade reading level. While administering the various subtests, the examiner marks a check list of instructional needs. The DURRELL begins with an oral reading test that provides an opportunity to record reading errors and speed. A check of comprehension is obtained by asking questions requiring recall of the paragraph content. Second is a silent reading test in which, after a paragraph is read silently, questions about the story are asked by the examiner. Recall and speed are recorded. Third, a listening comprehension test involves the teacher reading a paragraph and then asking questions. A word recognition and word analysis test is next. Words are quickly flashed on a hand tachistoscope and must be identified. If the word is not identified, it is shown for analysis. Several new tests included in the current edition measure an individual's skill in phonics by
testing his ability to identify the visual and auditory characteristics of various letters and words. Such skills as naming, identifying and matching letters, visual memory of words, hearing sounds in words, and knowing the sounds made by letters are all observed and recorded. Two supplementary tests included are written spelling and a timed handwriting drill.

From the limited information available, it was noted that the DURRELL was standardized on approximately 1000 children. After standardization, approximately 3000 tests were given, over a period of four years, to children with reading difficulties. Norms for grades one through six were rated as low, medium, or high. In an extensive use of this test, it has been found that the norms agree satisfactorily with other measures of reading ability (2, p. 32). In a criticism by Spache (13, p. 759), he points out that the nature of the standardization population is not known, there is no data available on reliability or validity of any of the tests, and speed is emphasized more than comprehension.

The Wepman Auditory Discrimination Test

The preliminary edition of the WEPMAN (16), published by Joseph Wepman in 1958, is for children between the ages of five and eight and is designed to measure the ability to recognize the fine distinctions that exist between the phonemes used in English speech. The WEPMAN has proved helpful in detecting children in the primary grade levels who are delayed
in their development of auditory discrimination. In use with older children, the WEPMAN has been found to be a useful diagnostic tool in evaluating reading and speech difficulties, as well as indicating a direction for remediation.

According to Wepman, speech accuracy has been related highly to auditory discrimination. To a lesser degree a relation has been found between reading ability and auditory discrimination. In the five to six year old range Wepman notes that the test is often able to predict a difficulty in learning to use the phonics necessary for reading. Further, the test may account for delayed speech accuracy on an auditory basis.

Wepman (15, pp. 329-330) noted that the WEPMAN measures only the ability to hear accurately. The examiner reads a pair of words and the child needs only to indicate, with a head shake or by a single word response, whether or not the pair of words are the same or different. It is of vital importance to the validity of the test that the administrator determine whether or not the child understands the difference between the concepts of "same" and "different." The word pairs selected for the test had to meet three criteria. First, each word of the pair had to occur with the same frequency in a child's vocabulary. The Lorge-Thorndike Teacher's Word Book of 30,000 Words was used to estimate the frequency factor. Second, the comparative sounds must be in the same position in each word and come from the same phonetic category. Third, the word pairs had to be of the same length. The
complete test battery consists of word pairs comparing thirteen initial consonants, four medial vowels, thirteen final consonants, and ten false choice pairs. For test-retest evaluation, two highly equated forms of the test have been prepared. Any test showing more than fifteen errors on matched word pairs or more than three errors on identical word pairs is considered invalid, and the other form is given.

Standardization of the WEPMAN (16) was accomplished by testing 533 unselected first, second, and third graders. The population sample came from both rural and urban communities. On the basis of these 533 tests, the following cut-off points were determined as indicators of inadequate auditory discrimination: more than six errors for five year olds; more than five errors for six year olds; more than four errors for seven year olds; and more than three errors for eight year olds. The errors are referring to an incorrect response to matched pairs, not identical word pairs.

Validity of the WEPMAN has been explored in a number of studies (16). A correlation of .32, using the Pearson product-moment, was found between auditory discrimination and intelligence. Twenty-two out of twenty-four children referred, over a three month period, to the University of Chicago Speech Clinic for articulation disorders had inadequate auditory discrimination. Out of 213 fourth grade children referred to an urban remedial reading program in Clearwater, Florida, ninety-four had inadequate auditory discrimination.
In Elmhurst, Illinois, eighty first graders in a non-urban consolidated school were also studied to test the validity of the WEPMAN. The fifty-eight with adequate auditory discrimination showed a reading mean of 2.2 and an IQ mean of 111. The twenty-two children with inadequate auditory discrimination showed a reading mean of 1.9 and an IQ mean of 106.5. While the differences in auditory discrimination and in reading were significant, the difference in IQ was not.

Seventy-six second grade children in the same school in Elmhurst, Illinois, were also examined. The sixty-two with adequate auditory discrimination had a reading mean of 3.5 and an IQ mean of 115. The fourteen with inadequate auditory discrimination had a reading mean of 2.8 and an IQ mean of 108. The differences in auditory discrimination and in reading were significant at the .01 level, and the difference in IQ was significant at the .05 level.
CHAPTER BIBLIOGRAPHY


CHAPTER III

RESULTS

The files of fifty-four children, referred to PAC for evaluation of general language disorders, were used to determine whether or not the ITPA can be used reliably as a predictor of achievement on other tests that are commonly used in evaluating children. The first edition of the ITPA was administered to thirty-seven of the subjects; the remaining seventeen were evaluated by the 1968 edition of the ITPA.

The total and subtests scores of the ITPA were compared with the total and subtests scores of the WISC, FROSTIG, WEPMAN, and DURRELL. Scale scores, which consider both group mean and variances and provide a more versatile means of comparing performance, were recorded for the total and subtests scores of the ITPA, WISC, FROSTIG, and DURRELL.

The DURRELL subtest scores are reported in terms of grade levels. In order to convert the subtests score to comparable scale scores, each subtest score was divided by the subject's age in months. The number was then multiplied by 1000 to remove the decimal point.

Each subtest and total test score of the ITPA was programmed to compute a simple correlation coefficient with each subtest and total test score of the WISC, FROSTIG, and
A Pearson product-moment correlation coefficient was obtained.

Scoring on the WEPMAN is indicated as either adequate or inadequate auditory discrimination. Adequacy is based on number of errors in relation to the age of the subject. For purposes of comparison adequate was recorded as one, and inadequate was recorded as two. The score on the WEPMAN was compared with the auditory reception, auditory association, and auditory memory subtests and total score of the 1968 ITPA and auditory decoding, auditory vocal association, and auditory vocal sequential subtests and total score on the 1961 ITPA. These comparisons were computed to obtain biserial correlation coefficients.

After the correlation coefficients were recorded, it was necessary to determine a level of significance. Blommers and Lindquist (1, p. 267) state that, "level of significance refers to the degree of improbability which is deemed necessary to cast sufficient doubt upon the truth of the hypothesis to warrant its rejection." It is further noted by Blommers and Lindquist (1, p. 281) that in selecting a level of significance or some small probability value, .01 and .05 are the levels most commonly judged as suitable.

Regardless of the level of significance, all correlation coefficients were recorded on the following tables. For this study, however, attention was given only to correlation coefficients at the .01 and .05 levels of significance. Guilford's (2, pp. 580-581) test provided a table to determine level of
significance. For the group containing seventeen subjects, a correlation coefficient of .606 or above was considered significant at the .01 level and .482 or above at the .05 level. For the group containing thirty-seven subjects, a correlation coefficient of .418 or above was considered significant at the .01 level and .325 or above at the .05 level.

In the following discussion of the various correlation coefficients, referral to the tables will reveal that not all significant correlation coefficients are mentioned. Blommers and Lindquist (1, p. 310) emphasize that the researcher should be careful not to infer that all significant correlations are necessarily of practical importance or consequence. It is possible for two test items to correlate significantly but actually not have a basis for comparison. The subtests and total tests that would appear to involve similar language or perceptive skills are discussed, and whether or not the correlation coefficients are significant is noted.

The subtests, involving visual skills, and total test scores of the ITPA were investigated as possible indicators of achievement on the FROSTIG. Table I shows the correlation coefficients between the 1968 ITPA and the FROSTIG. A positive correlation at the .05 level of significance was found between the visual receptive subtest of the ITPA and the spatial relationships and position in space subtests and the perceptual quotient of the FROSTIG. A positive correlation at the .05 level of significance was found between the
<table>
<thead>
<tr>
<th>1968 ITPA</th>
<th>FROSTIG</th>
</tr>
</thead>
<tbody>
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</table>

*.01 level of significance.  **.05 level of significance.
visual association subtest of the ITPA and the eye-hand coordination subtest and the perceptual quotient of the FROSTIG. A negative correlation at the .05 level of significance was found between the visual memory subtest of the ITPA and the figure-ground subtest of the FROSTIG. A positive correlation at the .05 level of significance was found between the visual closure subtest of the ITPA and the position in space subtest and the perceptual quotient of the FROSTIG. A positive correlation at the .01 level of significance was found between the total ITPA score and the form constancy and spatial relationships subtests of the FROSTIG and at the .05 level of significance between the total ITPA and the perceptual quotient of the FROSTIG.

Table II shows the correlation coefficients between the 1961 ITPA and the FROSTIG. A positive correlation at the .05 level of significance was found between the visual decoding subtest of the ITPA and the spatial relationships subtest and the perceptual quotient of the FROSTIG. A significant correlation was not found between the visual motor sequential and visual motor association subtests of the ITPA and any of the subtests or the perceptual quotient of the FROSTIG. A positive correlation at the .01 level of significance was found between the total ITPA score and the figure ground, form constancy, and the perceptual quotient of the FROSTIG and at the .05 level of significance between the total ITPA and the spatial relationships and position in space subtests of the FROSTIG.
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<tr>
<th>1961 ITPA</th>
<th>Eye-Hand Coordination</th>
<th>Figure Ground</th>
<th>Form Constancy</th>
<th>Spatial Relationships</th>
<th>Position in Space</th>
<th>Perceptual Quotient</th>
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<td>.45870</td>
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* .01 level of significance.  ** .05 level of significance.
Table III shows the correlation coefficients between the 1968 ITPA and the WISC. The verbal section of the WISC is found on page sixty-eight of Table III. The auditory reception subtest of the ITPA shows a positive correlation at the .05 level of significance with the information and comprehension subtests and at the .01 level of significance with the arithmetic and vocabulary subtest and total verbal score of the WISC. The auditory association subtest of the ITPA shows a positive correlation at the .05 level of significance with the vocabulary subtest and at the .01 level of significance with the information and similarities subtests and the total verbal score of the WISC. A significant correlation was not found between the verbal expression subtest of the ITPA and any of the verbal scores of the WISC. A positive correlation at the .01 level of significance was found between the grammatical closure subtest of the ITPA and the information subtest of the WISC. The total ITPA score shows a positive correlation at the .05 level of significance with the information, comprehension, and similarities subtests and at the .01 level of significance with the vocabulary subtest and the total verbal score of the WISC.

The performance section, as well as the full scale score, of the WISC and the 1968 ITPA are found on page sixty-nine of Table III. The visual reception subtest of the ITPA shows a positive correlation at the .05 level of significance with the block design and object assembly subtests and at the .01 level
**TABLE III**

CORRELATION COEFFICIENTS BETWEEN THE 1968 ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES AND THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN

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<th>WISC</th>
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<tr>
<td><strong>Visual Reception</strong></td>
<td>.6099 *</td>
</tr>
<tr>
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<tr>
<td><strong>Visual Association</strong></td>
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<tr>
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<tr>
<td><strong>Manual Expression</strong></td>
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</tr>
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<td><strong>Grammatical Closure</strong></td>
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</tr>
<tr>
<td><strong>Visual Closure</strong></td>
<td>.55349 **</td>
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<td>.78290 **</td>
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* .01 level of significance. ** .05 level of significance.
<table>
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<th>Picture Completion</th>
<th>Picture Arrangement</th>
<th>Block Design</th>
<th>Object Assembly</th>
<th>Coding</th>
<th>Total Performance</th>
<th>Full Scale Score</th>
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<td>.44645</td>
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<td>.47959</td>
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of significance with the picture arrangement subtest and total performance score of the WISC. A significant correlation was not found between the visual association subtest of the ITPA and any of the performance scores of the WISC. The manual expression subtest of the ITPA shows a positive correlation at the .05 level of significance with the object assembly subtest and the total performance score and at the .01 level of significance with the picture arrangement subtest of the WISC. The visual closure subtest of the ITPA shows a positive correlation at the .05 level of significance with the object assembly subtest and total performance score on the WISC. A significant correlation was not found between the visual memory subtest of the ITPA and any of the performance scores on the WISC. The total ITPA score shows a positive correlation at the .05 level of significance with the object assembly subtest and at the .01 level of significance with the picture arrangement and total performance score of the WISC.

Continuing on page sixty-nine of Table III, a positive correlation at the .01 level of significance was found between the auditory reception, visual reception, auditory association, and manual expression subtests and total test score of the ITPA and the full scale scores of the WISC.

Table IV shows the correlation coefficients between the 1961 ITPA and the WISC. The verbal section of the WISC is found on page seventy-one of Table IV. The auditory vocal
<table>
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<td>Arithmetic</td>
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<td>.43685</td>
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*.01 level of significance. **.05 level of significance.
TABLE IV --Continued

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<th>Block Design</th>
<th>Object Assembly</th>
<th>Coding</th>
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<td>* .52459</td>
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automatic subtest of the ITPA shows a positive correlation at the .01 level of significance with the information, arithmetic, similarities, and vocabulary subtests and the total verbal score of the WISC. The auditory vocal association subtest of the ITPA shows a positive correlation at the .05 level of significance with the comprehension subtest and at the .01 level of significance with the information, arithmetic, similarities, and vocabulary subtests and the total verbal score of the WISC. The vocal encoding subtest of the ITPA shows a positive correlation at the .05 level of significance with the comprehension and arithmetic subtests and at the .01 level of significance with the information, similarities, and vocabulary subtests and the total verbal score on the WISC. The auditory decoding subtest of the ITPA shows a positive correlation at the .05 level of significance with the information, arithmetic, and similarities subtests and the total verbal score on the WISC. The total ITPA score shows a positive correlation at the .01 level of significance with the information, comprehension, arithmetic, similarities, and vocabulary subtests and the total verbal score on the WISC.

The performance section, as well as the full scale score, of the WISC and the 1961 ITPA are found on page seventy-two of Table IV. The visual decoding subtest of the ITPA shows a positive correlation at the .05 level of significance with the picture completion subtest and total performance score.
and at the .01 level of significance with the block design subtest of the WISC. No significant correlation was found between the motor encoding subtest of the ITPA and any of the performance scores on the WISC. The visual motor sequential subtest of the ITPA shows a positive correlation at the .01 level of significance with the coding subtest of the WISC. No significant correlation was found between the visual motor association subtest of the ITPA and any of the performance scores on the WISC. The total ITPA score shows a positive correlation at the .05 level of significance with the picture completion, block design, and coding subtests and at the .01 level of significance with the picture arrangement subtest and total performance score on the WISC.

Continuing on page seventy-two of Table IV, a positive correlation at the .05 level of significance was found between the motor encoding and auditory decoding subtests of the ITPA and the full scale score of the WISC. At the .01 level of significance a positive correlation was found between the auditory vocal automatic, visual decoding, auditory vocal association, visual motor sequential, vocal encoding, and auditory vocal sequential subtests and total test score of the ITPA and the full scale score of the WISC.

Table V shows the correlation coefficients between the 1968 ITPA and the DURRELL. Significant correlations were not found between the visual reception, visual association, visual closure, or visual memory subtests of the ITPA and the oral
TABLE V
CORRELATION COEFFICIENTS BETWEEN THE 1968 ILLINOIS TEST OF PSYCHOLOGICAL ABILITIES AND THE DURRELL ANALYSIS OF READING DIFFICULTIES

<table>
<thead>
<tr>
<th>1968 ITPA</th>
<th>Oral Reading</th>
<th>Silent Reading</th>
<th>Listening</th>
<th>Flash Words</th>
<th>Word Analysis</th>
<th>Spelling</th>
<th>Visual Memory</th>
<th>Sounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditory Reception</td>
<td>-.01069</td>
<td>.44510</td>
<td>.09988</td>
<td>.31742</td>
<td>.34947</td>
<td>.20999</td>
<td>.07112</td>
<td>.12226</td>
</tr>
<tr>
<td>Visual Reception</td>
<td>.09353</td>
<td>.28923</td>
<td>.27456</td>
<td>.26062</td>
<td>.31830</td>
<td>.47142</td>
<td>.32102</td>
<td>.27303</td>
</tr>
<tr>
<td>Auditory Association</td>
<td>.03290</td>
<td>.30467</td>
<td>.37262</td>
<td>.23823</td>
<td>.23434</td>
<td>.06257</td>
<td>-.16316</td>
<td>.23943</td>
</tr>
<tr>
<td>Visual Association</td>
<td>.14037</td>
<td>.18452</td>
<td>-.17463</td>
<td>.23526</td>
<td>.29591</td>
<td>.17611</td>
<td>.26075</td>
<td>-.08427</td>
</tr>
<tr>
<td>Verbal Expression</td>
<td>.34597</td>
<td>.49209**</td>
<td>.38574</td>
<td>.39016</td>
<td>.36568</td>
<td>.10381</td>
<td>-.01154</td>
<td>-.21599</td>
</tr>
<tr>
<td>Manual Expression</td>
<td>.15310</td>
<td>.56754**</td>
<td>.51384</td>
<td>.33813</td>
<td>.37290</td>
<td>.13815</td>
<td>.07843</td>
<td>-.00910</td>
</tr>
<tr>
<td>Grammatical Closure</td>
<td>.42175</td>
<td>.64805*</td>
<td>.21005</td>
<td>.57186**</td>
<td>.54491**</td>
<td>.34337</td>
<td>.11690</td>
<td>.35523</td>
</tr>
<tr>
<td>Visual Closure</td>
<td>.12828</td>
<td>.12762</td>
<td>.17976</td>
<td>.19356</td>
<td>.17404</td>
<td>.14406</td>
<td>.10573</td>
<td>.26133</td>
</tr>
<tr>
<td>Auditory Memory</td>
<td>-.31418</td>
<td>-.11940</td>
<td>.11105</td>
<td>-.10996</td>
<td>-.05769</td>
<td>-.19319</td>
<td>-.26723</td>
<td>-.10767</td>
</tr>
<tr>
<td>Visual Memory</td>
<td>-.24662</td>
<td>-.26239</td>
<td>-.17753</td>
<td>-.03008</td>
<td>-.05002</td>
<td>-.23980</td>
<td>-.10750</td>
<td>.19422</td>
</tr>
<tr>
<td>Total</td>
<td>.23761**</td>
<td>.51822</td>
<td>.25858</td>
<td>.45093</td>
<td>.46642</td>
<td>.26683</td>
<td>.13891</td>
<td>.25001</td>
</tr>
</tbody>
</table>

*.01 level of significance.

**.05 level of significance.
reading, silent reading, flash words, word analysis, spelling, or visual memory subtests of the DURRELL. In addition, a significant correlation could not be found between the auditory association, auditory reception, or auditory memory subtests of the ITPA and the listening, spelling, or sounds subtests of the DURRELL. A positive correlation at the .05 level of significance was found between the total ITPA score and the silent reading score on the DURRELL.

Table VI shows the correlation coefficients between the 1961 ITPA and the DURRELL. A significant correlation could not be found between the visual decoding subtest of the ITPA and the oral reading, silent reading, or spelling subtests of the DURRELL. A positive correlation at the .01 level of significance was found between the visual decoding subtest of the ITPA and the flash words, word analysis, and visual memory subtests of the DURRELL.

A significant correlation could not be found between the visual motor sequential subtest of the ITPA and the spelling or visual memory subtests of the DURRELL. The visual motor sequential subtest of the ITPA did show a positive correlation at the .05 level of significance with flash words and word analysis subtests and at the .01 level of significance with the oral reading and silent reading subtests of the DURRELL.

A significant correlation could not be found between the visual motor association subtest of the ITPA and the spelling or visual memory subtests of the DURRELL. A positive correlation at the .05 level of significance was found between the
### TABLE VI

**CORRELATION COEFFICIENTS BETWEEN THE 1961 ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES AND THE DURRELL ANALYSIS OF READING DIFFICULTIES**

<table>
<thead>
<tr>
<th>1963 ITPA</th>
<th>Oral Reading</th>
<th>Silent Reading</th>
<th>Listening</th>
<th>Flash Words</th>
<th>Word Analysis</th>
<th>Spelling</th>
<th>Visual Memory</th>
<th>Sounds</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Auditory Vocal Automatic</strong></td>
<td>.5691*</td>
<td>.6350*</td>
<td>.5643*</td>
<td>.5692*</td>
<td>.5769*</td>
<td>.6006*</td>
<td>.5190*</td>
<td>.58488</td>
</tr>
<tr>
<td><strong>Visual Decoding</strong></td>
<td>.31308</td>
<td>.29591</td>
<td>.42309*</td>
<td>.42222*</td>
<td>.38938*</td>
<td>.23750</td>
<td>.51903*</td>
<td>.19003</td>
</tr>
<tr>
<td><strong>Motor Encoding</strong></td>
<td>.14667</td>
<td>.13408</td>
<td>.18265</td>
<td>.21586</td>
<td>.17603</td>
<td>.24980</td>
<td>.29928</td>
<td>**</td>
</tr>
<tr>
<td><strong>Auditory Vocal Association</strong></td>
<td>.34112**</td>
<td>.33160**</td>
<td>.39762**</td>
<td>.36781**</td>
<td>.39229**</td>
<td>.35174</td>
<td>.42224*</td>
<td>.38643</td>
</tr>
<tr>
<td><strong>Visual Motor Sequential</strong></td>
<td>.44243*</td>
<td>.40127**</td>
<td>.30030**</td>
<td>.35438**</td>
<td>.34589**</td>
<td>.12790</td>
<td>.29700</td>
<td>.20071</td>
</tr>
<tr>
<td><strong>Vocal Encoding</strong></td>
<td>.19008</td>
<td>.24057</td>
<td>.33564**</td>
<td>.13613*</td>
<td>.15236</td>
<td>.16173</td>
<td>.25530</td>
<td>**</td>
</tr>
<tr>
<td><strong>Auditory Vocal Sequential</strong></td>
<td>.52446*</td>
<td>.54179*</td>
<td>.58879*</td>
<td>.53867*</td>
<td>.54392*</td>
<td>.45819</td>
<td>.52228*</td>
<td>**</td>
</tr>
<tr>
<td><strong>Visual Motor Association</strong></td>
<td>.32524**</td>
<td>.36445**</td>
<td>.12619</td>
<td>.35070**</td>
<td>.33224**</td>
<td>.29294</td>
<td>.22129</td>
<td>**</td>
</tr>
<tr>
<td><strong>Auditory Decoding</strong></td>
<td>.23510</td>
<td>.21847</td>
<td>.38786**</td>
<td>.25628*</td>
<td>.24620</td>
<td>.13664</td>
<td>.41783*</td>
<td>.22549</td>
</tr>
<tr>
<td>Total</td>
<td>.57556*</td>
<td>.59488*</td>
<td>.63203*</td>
<td>.59672*</td>
<td>.58952*</td>
<td>.50337*</td>
<td>.65059*</td>
<td>.63510</td>
</tr>
</tbody>
</table>

*.01 level of significance.

**.05 level of significance.
visual motor association subtest of the ITPA and the oral reading, silent reading, flash words, and word analysis subtests of the DURRELL.

The auditory vocal association subtest of the ITPA shows a positive correlation at the .05 level of significance with the listening, spelling, and sounds subtests of the DURRELL.

A positive correlation at the .01 level of significance was found between the auditory vocal sequential subtest of the ITPA and the listening, spelling, and sounds subtests of the DURRELL.

A significant correlation could not be found between the auditory decoding subtest of the ITPA and the spelling or sounds subtests of the DURRELL. A positive correlation at the .05 level of significance was found between the auditory decoding subtest of the ITPA and the listening subtest of the DURRELL.

The total score of the ITPA shows a positive correlation at the .01 level of significance with all of the subtests of the DURRELL.

Table VII shows the correlation coefficients between the WEPMAN and the 1961 and 1968 ITPA. The score on the WEPMAN was computed to compare only with the scores on selected subtests, measuring auditory skills, and total score on the 1961 and 1968 ITPA.
TABLE VII

<table>
<thead>
<tr>
<th>1961 ITPA</th>
<th>WEPMAN</th>
<th>1968 ITPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditory Vocal</td>
<td></td>
<td>Grammatical</td>
</tr>
<tr>
<td>Automatic</td>
<td>-.4375</td>
<td>-.2877</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Closure</td>
</tr>
<tr>
<td>Auditory Vocal</td>
<td></td>
<td>Auditory</td>
</tr>
<tr>
<td>Association</td>
<td>-.4475</td>
<td>-.1061</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Association</td>
</tr>
<tr>
<td>Auditory Vocal</td>
<td></td>
<td>Auditory</td>
</tr>
<tr>
<td>Sequential</td>
<td>-.3403</td>
<td>.0166</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Memory</td>
</tr>
<tr>
<td>Auditory Decoding</td>
<td>-.1331</td>
<td>-.0557</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
</tr>
<tr>
<td>Reception</td>
<td></td>
<td>Reception</td>
</tr>
<tr>
<td>Total</td>
<td>-.4903*</td>
<td>-.2460</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

*.01 level of significance.  **.05 level of significance.

In comparing the 1961 ITPA with the WEPMAN, negative correlations at the .01 level of significance were found between the auditory vocal automatic and auditory vocal association subtests scores and the total test score of the ITPA and the score on the WEPMAN. A negative correlation at the .05 level of significance was found between the auditory vocal sequential subtest of the ITPA and the score on the WEPMAN. A significant correlation was not found between the auditory decoding subtests of the ITPA and the score on the WEPMAN.

Continuing on Table VII, significant correlations were not found between grammatical closure, auditory association,
auditory memory, or auditory reception subtests scores or the total test score on the 1968 ITPA and the score on the WEPMAN.

In the preceding discussion both editions of the ITPA were studied, individually, according to how they correlated with the WISC, FROSTIG, DURRELL, and WEPMAN. Subtests were selected for comparison on the basis of their appearing to involve similar language and perceptive skills.

The following pages will discuss and illustrate comparisons of selected subtests and total test scores of the 1961 ITPA and the 1968 ITPA. When the 1961 ITPA is matched, according to subtest, with the 1968 ITPA, a comparison can be made of how matching subtests correlate with a selected subtest or total test score on the WISC, FROSTIG, DURRELL, and WEPMAN. Referral to the last paragraph on page 44 will provide a review of the matching subtest names of the 1961 and 1968 ITPA.

Comparison of the 1961 and 1968 ITPA should include some information on the fifty-four subjects when they are considered as two different groups. From the results of auditory and visual tests of acuity and observation of motor skills, it was determined that not any of the children in either group were handicapped by severe auditory, visual, or motoric defects which would interfere with or limit their ability to learn.

The seventeen children who were administered the 1968 ITPA showed intelligence quotients ranging from 62 to 120, with a mean of 94, and ages ranging from seven years and one month to ten years and one month, with a mean of eight years
and eight months. The thirty-seven children evaluated with the 1961 ITPA showed intelligence quotients ranging from 73 to 133, with a mean of 102, and ages ranging from seven years and one month to nine years and three months, with a mean of eight years and four months. The children who were given the 1961 ITPA had a mean age four months younger and a mean intelligence quotient eight points higher than the children in the group evaluated by the 1968 ITPA.

Table VIII shows a comparison of the correlations of subtest scores, involving visual skills, and the total test scores of both the 1961 and the 1968 ITPA with the scores on the FROSTIG. Both the visual decoding subtest of the 1961 ITPA and the visual reception subtest of the 1968 ITPA correlate positively at the .05 level of significance with the spatial relationships subtest and the perceptual quotient of the FROSTIG. The visual reception subtest shows a positive correlation at the .05 level of significance with the position in space subtest, but the visual decoding subtest does not correlate significantly with position in space. Neither visual decoding nor visual reception correlate significantly with eye-hand coordination, figure ground or form constancy.

The visual motor sequential subtest of the 1961 ITPA does not correlate significantly with any part of the FROSTIG. The visual memory subtest of the 1968 ITPA correlates negatively at the .05 level of significance with the figure ground subtest of the FROSTIG but does not correlate significantly with the other parts of the FROSTIG.
<table>
<thead>
<tr>
<th>1961 and 1968 ITPA</th>
<th>FROSTIG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Eye-Hand Coordination</td>
</tr>
<tr>
<td>Visual Decoding-1*</td>
<td>.23651</td>
</tr>
<tr>
<td>Visual Reception-2</td>
<td>.36237</td>
</tr>
<tr>
<td>Visual Motor Sequential-1</td>
<td>.21249</td>
</tr>
<tr>
<td>Visual Memory-2</td>
<td>-.12250</td>
</tr>
<tr>
<td>Visual Motor Association-1</td>
<td>-.06096</td>
</tr>
<tr>
<td>Visual Association-2</td>
<td>.51166</td>
</tr>
<tr>
<td>Total-1</td>
<td>.28548</td>
</tr>
<tr>
<td>Total-2</td>
<td>.46612</td>
</tr>
</tbody>
</table>

*"1"--1961 ITPA, "2"--1968 ITPA.  
**.01 level of significance.  
***.05 level of significance.
The visual motor association subtest of the 1961 ITPA does not correlate significantly with any part of the FROSTIG. The visual association subtest of the 1968 ITPA correlates positively at the .05 level of significance with the eye-hand coordination subtest and the perceptual quotient of the FROSTIG.

Both 1961 and 1968 ITPA total scores correlate positively at the .01 level of significance with the form constancy subtest of the FROSTIG. The total 1961 ITPA score correlates positively at the .01 level of significance with figure ground and perceptual quotient and at the .05 level of significance with spatial relationships and position in space. The total 1968 ITPA score correlates positively at the .01 level of significance with spatial relationships and form constancy and at the .05 level of significance with perceptual quotient. Neither the total 1968 nor 1961 ITPA correlates significantly with eye-hand coordination, and the total 1968 ITPA does not correlate significantly with figure ground or position in space.

Table IX shows the comparison of the correlations of selected subtests and total test scores of the 1961 and 1968 ITPA with the verbal section of the WISC. The auditory vocal automatic subtest of the 1961 ITPA and the grammatical closure subtest of the 1968 ITPA both correlate positively at the .01 level of significance with the information subtest of the WISC. Grammatical closure does not correlate significantly with the rest of the verbal WISC. Auditory vocal automatic correlates positively at the .01 level of significance with arithmetic, similarities, vocabulary, and total verbal WISC.
### TABLE IX

**COMPARISON OF SELECTED SUBTESTS OF THE 1961 AND 1968 ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES AND THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN—VERBAL**

<table>
<thead>
<tr>
<th>1961 and 1968 ITPA</th>
<th>WISC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Information</td>
</tr>
<tr>
<td>Auditory Vocal</td>
<td></td>
</tr>
<tr>
<td>Automatic-1*</td>
<td>.62725</td>
</tr>
<tr>
<td>Grammatical Closure-2</td>
<td>.60647</td>
</tr>
<tr>
<td>Auditory Vocal</td>
<td></td>
</tr>
<tr>
<td>Association-1</td>
<td>.72008</td>
</tr>
<tr>
<td>Association-2</td>
<td>.73980</td>
</tr>
<tr>
<td>Vocal</td>
<td></td>
</tr>
<tr>
<td>Encoding-1</td>
<td>.54445</td>
</tr>
<tr>
<td>Verbal Expression-2</td>
<td>.23034</td>
</tr>
<tr>
<td>Auditory</td>
<td></td>
</tr>
<tr>
<td>Decoding-1</td>
<td>.34802</td>
</tr>
<tr>
<td>Reception-2</td>
<td>.60591</td>
</tr>
<tr>
<td>Total-1</td>
<td>.72213</td>
</tr>
<tr>
<td>Total-2</td>
<td>.78290</td>
</tr>
</tbody>
</table>

*"1"—1961 ITPA, "2"—1968 ITPA.*

**.01 level of significance.

***.05 level of significance.
The auditory vocal association subtest of the 1961 ITPA and the auditory association subtest of the 1968 ITPA correlates positively at the .01 level of significance with information, vocabulary, and total verbal of the WISC. Auditory vocal association correlates positively at the .01 level of significance and auditory association at the .05 level of significance with similarities. Auditory vocal association correlates positively at the .05 level of significance with comprehension and at the .01 level of significance with arithmetic, but auditory association does not correlate significantly with either comprehension or arithmetic.

The vocal encoding subtest of the 1961 ITPA correlates positively at the .01 level of significance with information, similarities, vocabulary, and total verbal and at the .05 level of significance with comprehension and arithmetic of the WISC. The verbal expression subtest of the 1968 ITPA does not correlate significantly with any of the verbal section of the WISC.

Both auditory decoding of the 1961 ITPA and auditory reception of the 1968 ITPA correlate positively at the .05 level of significance with information on the WISC. Auditory decoding correlates positively at the .05 level of significance and auditory reception correlates positively at the .01 level of significance with arithmetic and total verbal. Auditory reception correlates positively at the .01 level of significance with vocabulary and at the .05 level with
comprehension, but auditory decoding does not correlate significantly with either vocabulary or comprehension. Auditory decoding correlates positively at the .05 level of significance with similarities, but auditory reception does not correlate significantly with similarities.

The total scores of the 1961 and 1968 ITPA correlate positively at the .01 level of significance with vocabulary and total verbal on the WISC. The total 1961 ITPA score correlates positively at the .01 level of significance and the total 1968 ITPA score correlates positively at the .05 level of significance with information, comprehension, and similarities. The total 1961 ITPA correlates positively at the .01 level of significance with arithmetic, but the total 1968 ITPA does not correlate significantly with arithmetic.

Table X shows the comparison of the correlations of selected subtests and total test scores of the 1961 and 1968 ITPA with the performance section of the WISC. Visual decoding of the 1961 ITPA correlates positively at the .01 level of significance with block design and at the .05 level with total performance of the WISC, and visual reception of the 1968 ITPA correlates positively at the .05 level of significance with block design and at the .01 level with total performance on the WISC. Visual reception correlates positively at the .01 level of significance with picture arrangement and at the .05 level with object assembly, but visual decoding does not correlate significantly with either object assembly.
### TABLE X

**COMPARISON OF SELECTED SUBTESTS OF THE 1961 AND 1968 ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES AND THE WECHSLER INTELLIGENCE SCALE FOR CHILDREN—PERFORMANCE**

<table>
<thead>
<tr>
<th></th>
<th>WISC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1961 and 1968 ITPA</strong></td>
<td><strong>Picture Completion</strong></td>
</tr>
<tr>
<td>Visual Decoding-1*</td>
<td>.37507</td>
</tr>
<tr>
<td>Visual Reception-2</td>
<td>.39391</td>
</tr>
<tr>
<td>Motor Encoding-1</td>
<td>.30868</td>
</tr>
<tr>
<td>Manual Expression-2</td>
<td>.08829</td>
</tr>
<tr>
<td>Visual Motor Sequential-1</td>
<td>.05351</td>
</tr>
<tr>
<td>Visual Memory-2</td>
<td>-.08368</td>
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<td>Visual Motor Association-1</td>
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<tr>
<td>Visual Association-2</td>
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</tr>
<tr>
<td>Total-1</td>
<td>.39156</td>
</tr>
<tr>
<td>Total-2</td>
<td>.28914</td>
</tr>
</tbody>
</table>

*"1"—1961 ITPA, "2"—1968 ITPA.

**.01 level of significance.

***.05 level of significance.
or picture arrangement. Neither visual decoding nor visual reception correlates significantly with coding. Visual decoding correlates positively at the .05 level of significance with picture completion, but visual reception does not correlate significantly with picture completion.

The motor encoding subtest of the 1961 ITPA does not correlate significantly with any of the performance section of the WISC. The manual expression subtest of the 1968 ITPA correlates positively at the .01 level of significance with picture arrangement and at the .05 level with object assembly and total performance.

The visual motor sequential subtest of the 1961 ITPA correlates positively at the .01 level of significance with coding on the WISC. The visual memory subtest of the 1968 ITPA does not correlate significantly with any of the performance section of the WISC.

Neither the visual motor association subtest of the 1961 ITPA nor the visual association subtest of the 1968 ITPA correlate significantly with any part of the performance section of the WISC.

Both total scores on the 1961 and 1968 ITPA correlate positively at the .01 level of significance with picture arrangement and total performance on the WISC. The total score on the 1961 ITPA correlates positively at the .05 level of significance with picture completion, block design, and coding, but the total score on the 1968 ITPA does not correlate
significantly with picture completion, block design, or coding. The total score on the 1968 ITPA correlates positively at the .05 level of significance with object assembly, but the total score on the 1961 ITPA does not correlate significantly with object assembly.

Table XI shows the comparison of the correlations of the 1961 and 1968 ITPA scores with the full scale score on the WISC.

### TABLE XI


<table>
<thead>
<tr>
<th>1961 ITPA</th>
<th>WISC Full Scale Score</th>
<th>1968 ITPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditory Vocal Automatic</td>
<td>.62930</td>
<td>* .33800</td>
</tr>
<tr>
<td>Visual Decoding</td>
<td>.42628</td>
<td>* .72849</td>
</tr>
<tr>
<td>Motor Encoding</td>
<td>.33727</td>
<td>** .61714</td>
</tr>
<tr>
<td>Auditory Vocal Association</td>
<td>.62545</td>
<td>* .67944</td>
</tr>
<tr>
<td>Visual Motor Sequential</td>
<td>.42665</td>
<td>* -.04004</td>
</tr>
<tr>
<td>Vocal Encoding</td>
<td>.54681</td>
<td>.25581</td>
</tr>
<tr>
<td>Auditory Vocal Sequential</td>
<td>.65926</td>
<td>* .44391</td>
</tr>
<tr>
<td>Visual Motor Association</td>
<td>.31083</td>
<td>.22701</td>
</tr>
<tr>
<td>Auditory Decoding</td>
<td>.36732</td>
<td>** .71358</td>
</tr>
<tr>
<td>Total</td>
<td>.82481</td>
<td>* .73228</td>
</tr>
</tbody>
</table>

* .01 level of significance.  ** .05 level of significance.
Visual decoding, auditory vocal association, and total 1961 ITPA scores and visual reception, auditory association, and total 1968 ITPA scores correlate positively at the .01 level of significance with the full scale score of the WISC.

Auditory vocal automatic, visual motor sequential, vocal encoding, and auditory vocal sequential of the 1961 ITPA correlate positively at the .01 level of significance with the full scale score of the WISC, but the corresponding subtests on the 1968 ITPA, grammatical closure, visual memory, verbal expression, and auditory memory, do not correlate significantly with the full scale score of the WISC.

Motor encoding and auditory decoding of the 1961 ITPA show positive correlations at the .05 level and manual expression and auditory reception of the 1968 ITPA show positive correlations at the .01 level of significance with the full scale score of the WISC.

Neither visual motor association of the 1961 ITPA nor visual association of the 1968 ITPA correlate significantly with the full scale score of the WISC.

Table XII shows the comparison of the correlations of selected subtests and total test scores of the 1961 and 1968 ITPA with the DURRELL. The visual decoding subtest of the 1961 ITPA correlates positively at the .01 level of significance with the listening, flash words, and visual memory subtests and at the .05 level with the word analysis subtest of the DURRELL. The visual reception subtest of the 1968 ITPA does not correlate significantly with any part of the DURRELL.
TABLE XII


<table>
<thead>
<tr>
<th>1961 and 1968 ITPA</th>
<th>DURRELL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oral Reading</td>
</tr>
<tr>
<td>Visual Decoding-1*</td>
<td>.31308</td>
</tr>
<tr>
<td>Visual Reception-2</td>
<td>.09353</td>
</tr>
<tr>
<td>Visual Motor Sequential-1</td>
<td>.44243</td>
</tr>
<tr>
<td>Visual Association-2</td>
<td>-.24662</td>
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<tr>
<td>Visual Motor Association-1</td>
<td>.32524</td>
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<tr>
<td>Visual Association-2</td>
<td>.14037</td>
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<tr>
<td>Total-1</td>
<td>**.57556</td>
</tr>
<tr>
<td>Total-2</td>
<td>.23761</td>
</tr>
</tbody>
</table>

*"1"--1961 ITPA, "2"--1968 ITPA.

**.01 level of significance.

***.05 level of significance.
The visual motor sequential subtest of the 1961 ITPA correlates positively at the .01 level of significance with oral reading and at the .05 level of significance with silent reading, flash words, and word analysis on the DURRELL. The visual memory subtest of the 1968 ITPA does not correlate significantly with any part of the DURRELL.

The visual motor association subtest of the 1961 ITPA correlates positively at the .01 level of significance with sounds and at the .05 level of significance with oral reading, silent reading, flash words, and word analysis subtests on the DURRELL. The visual association subtest of the 1968 ITPA does not correlate significantly with any part of the DURRELL.

The total score on the 1961 ITPA correlates positively at the .01 level of significance with all parts of the DURRELL. The only part of the DURRELL that the total score on the 1968 ITPA correlates significantly with is silent reading at the .05 level.

Referral back to Table VII shows that a comparison of the correlations of selected scores on the 1961 and 1968 ITPA with the WEPMAN is illustrated. All of the subtests measuring auditory skill, except auditory decoding, and the total test scores of the 1961 ITPA show significant negative correlations with the WEPMAN. Not any of the subtests involving auditory skill or the total test scores of the 1968 ITPA correlate significantly with the WEPMAN.
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CHAPTER IV

SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to determine whether or not performance on the ITPA can be used reliably as a predictor of achievement on the WISC, FROSTIG, WEPMAN, and DURRELL in evaluating children suspected of having language disorders. The files of children referred to the Pupil Appraisal Center at North Texas State University, for evaluation of general learning disorders, provided the source of information for this study. A total of fifty-four children were within the age range of six to ten years, at the time of PAC's evaluation, and had been administered either edition of the ITPA, the WISC, FROSTIG, WEPMAN, and DURRELL. Seventeen children had been administered the 1968 revision of the ITPA, and thirty-seven had been administered the first, 1961 edition of the ITPA. The subjects' ages ranged from seven years and one month to ten years and one month, with a mean age of eight years and six months.

The subtests and total test scale scores of the ITPA were programmed to compute a Pearson product-moment correlation coefficient with each subtest and total test scale score of the WISC, FROSTIG, and DURRELL. Only the auditory reception, auditory association, auditory memory, and grammatical closure
subtests and total test score of the 1968 ITPA and the auditory decoding, auditory vocal automatic, auditory association, and auditory vocal sequential subtests and total test score of the 1961 ITPA were programmed to compute biserial correlations with the WEPSMAN.

For this study only those correlation coefficients at the .01 and .05 levels of significance were considered. For the group containing seventeen subjects, a correlation coefficient of .606 or above was considered significant at the .01 level and .482 or above at the .05 level. For the group containing thirty-seven subjects, a correlation coefficient of .418 or above was considered significant at the .01 level and .325 or above at the .05 level.

The subtests, involving visual skills, and the total test scores of the ITPA were compared with the FROSTIG. The following comparisons between the 1968 ITPA and the FROSTIG revealed significant positive correlation coefficients at the .05 level: visual reception of the ITPA with spatial relationships, position in space, and the perceptual quotient of the FROSTIG; visual association of the ITPA with eye-hand coordination, and perceptual quotient of the FROSTIG; visual closure of the ITPA with position in space and perceptual quotient of the FROSTIG; and total score of ITPA with perceptual quotient of the FROSTIG. A negative correlation coefficient at the .05 level of significance was found between the visual memory subtest of the ITPA and the figure ground subtest of the FROSTIG.
At the .01 level of significance a positive correlation coefficient was found between the total ITPA and the form constancy and spatial relationships subtests of the FROSTIG.

The following comparisons between the 1961 ITPA and the FROSTIG revealed significant positive correlation coefficients at the .05 level: visual decoding of the ITPA with spatial relationships and perceptual quotient of the FROSTIG; and total ITPA with spatial relationships and position in space of the FROSTIG. Significant correlation coefficients were not found between visual motor sequential and visual motor association of the ITPA and any part of the FROSTIG. The total ITPA score showed a positive correlation coefficient at the .01 level of significance with figure ground, form constancy, and perceptual quotient of the FROSTIG.

The ITPA was compared with both the verbal and performance sections of the WISC. The following comparisons between the 1968 ITPA and the verbal section of the WISC revealed significant positive correlations at the .05 level: auditory reception of the ITPA with information and comprehension of the WISC; auditory association of the ITPA with vocabulary of the WISC; and total ITPA with information, comprehension, and similarities of the WISC. At the .01 level the following positive correlations were found: auditory reception of the ITPA with arithmetic, vocabulary, and total verbal of the WISC; auditory association of the ITPA with information, similarities, and total verbal of the WISC; grammatical closure of the ITPA
with information of the WISC; and total ITPA with vocabulary and total verbal of the WISC. Significant correlations were not found between verbal expression of the ITPA and any of the verbal section of the WISC.

The following comparisons between the 1968 ITPA and the performance section of the WISC revealed significant positive correlations at the .05 level: visual reception of the ITPA with block design and object assembly of the WISC; manual expression of the ITPA with object assembly and total performance of the WISC; visual closure of the ITPA with object assembly and total performance of the WISC; and total ITPA with object assembly of the WISC. At the .01 level the following positive correlations were found: visual reception of the ITPA with picture arrangement and total performance of the WISC; manual expression of the ITPA with picture arrangement of the WISC; and total ITPA with picture arrangement and total performance of the WISC. Significant correlations were not found between visual association and visual memory of the ITPA and any of the performance section of the WISC.

Positive correlations at the .01 level of significance were found between the auditory reception, visual reception, auditory association, and manual expression subtests and total score of the 1968 ITPA and the full scale score of the WISC.

The following comparisons between the 1961 ITPA and the verbal section of the WISC indicated significant positive correlations at the .05 level: auditory vocal association of the
ITPA with comprehension of the WISC; vocal encoding of the ITPA with comprehension and arithmetic of the WISC; and auditory decoding of the ITPA with information, arithmetic, similarities, and total verbal of the WISC. At the .01 level of significance the following positive correlations were found: auditory vocal automatic and auditory vocal association of the ITPA with information, arithmetic, similarities, vocabulary, and total verbal of the WISC; vocal encoding of the ITPA with information, similarities, vocabulary, and total verbal of the WISC; and total ITPA with all of the verbal section of the WISC.

The following comparisons between the 1961 ITPA and the performance section of the WISC revealed significant positive correlations at the .05 level: visual decoding of the ITPA with picture completion and total performance of the WISC and total ITPA with picture completion, block design, and coding of the WISC. At the .01 level of significance the following positive correlations were found: visual decoding of the ITPA with block design of the WISC; visual motor sequential of the ITPA with coding of the WISC; and total ITPA with picture arrangement and total performance of the WISC. There were no significant correlations between motor encoding and visual motor association subtests of the ITPA and any of the performance section of the WISC.

Positive correlations at the .05 level of significance were found between the motor encoding and auditory decoding
subtests of the ITPA and the full scale score of the WISC. At the .01 level of significance positive correlations were found between the auditory vocal automatic, visual decoding, auditory vocal association, visual motor sequential, vocal encoding, and auditory vocal sequential subtests and total ITPA and the full scale score of the WISC.

The 1968 ITPA was compared with the performance on the DURRELL. Significant correlations could not be found between the visual reception, visual association, visual closure, or visual memory subtests of the ITPA and the oral reading, silent reading, flash words, word analysis, spelling, or visual memory subtests of the DURRELL. In addition, significant correlations did not exist between the auditory association, auditory reception, or auditory memory subtests of the ITPA and the listening, spelling, or sounds subtests of the DURRELL. The total score of the ITPA did show a positive correlation at the .05 level with the silent reading subtest of the DURRELL.

In comparing the 1961 ITPA with the DURRELL the following positive correlations were found at the .05 level of significance: visual motor sequential of the ITPA with flash words and word analysis of the DURRELL; visual motor association of the ITPA with oral reading, silent reading, flash words, and word analysis of the DURRELL; auditory vocal association of the ITPA with listening, spelling, and sounds of the DURRELL; and auditory decoding of the ITPA with listening of the DURRELL.
At the .01 level of significance the following positive correlations were revealed: visual decoding of the ITPA with flash words, word analysis, and visual memory of the DURRELL; visual motor sequential of the ITPA with oral reading and silent reading of the DURRELL; auditory vocal sequential of the ITPA with listening, spelling, and sounds of the DURRELL; and total ITPA with all of the subtests of the DURRELL. The following comparisons did not indicate significant correlations: visual decoding of the ITPA with oral reading, silent reading, or spelling of the DURRELL; visual motor sequential of the ITPA with spelling or visual memory of the DURRELL; visual motor association of the ITPA with spelling or visual memory of the DURRELL; and auditory decoding of the ITPA with spelling or sounds of the DURRELL.

When the WEPMAN score was compared with subtests involving auditory skill and the total test scores on the 1961 ITPA, negative correlations at the .01 level of significance were revealed between auditory vocal automatic, auditory vocal association, and total ITPA score and the WEPMAN. Auditory vocal sequential correlated negatively at the .05 level of significance, and auditory decoding did not correlate significantly with the WEPMAN.

The grammatical closure, auditory association, auditory memory, and auditory reception subtests and the total test scores on the 1968 ITPA did not correlate significantly with the score on the WEPMAN.
In summarizing the comparison of the 1961 and 1968 ITPA, a distinction will not be made between correlations at the .01 and .05 level of significance as this has been previously discussed in detail. Unless indicated, all correlations are positive. Comparison will be done on the basis of matched subtests.

Visual decoding of the 1961 ITPA is compared with visual reception of the 1968 ITPA on correlations with the FROSTIG, WISC, and DURRELL. On the FROSTIG, visual decoding and visual reception correlate significantly with spatial relationships and perceptual quotient, and visual reception correlates significantly with position in space. On the performance WISC, the following correlations were found to be significant: visual decoding and visual reception with block design, total performance and full scale score; visual decoding with picture completion; and visual reception with picture arrangement and object assembly. On the DURRELL, visual decoding correlates with listening, flash words, word analysis, and visual memory, but visual reception does not correlate significantly with any part of the DURRELL.

Visual motor sequential of the 1961 ITPA is compared with visual memory of the 1968 ITPA on correlations with the FROSTIG, WISC, and DURRELL. On the FROSTIG, visual memory correlates negatively with figure ground, but visual motor sequential does not correlate significantly with any part of the FROSTIG. On the performance WISC, visual motor sequential correlates
with coding and full scale score, but visual memory does not correlate with any part of the performance WISC. On the DURRELL, visual motor sequential correlates with oral reading, silent reading, flash words, and word analysis, but visual memory does not correlate significantly with any part of the DURRELL.

Visual motor association of the 1961 ITPA is compared with visual association of the 1968 ITPA on correlations with the FROSTIG, WISC, and DURRELL. On the FROSTIG, visual association correlates with eye-hand coordination and perceptual quotient, but visual motor association does not correlate significantly with any part of the FROSTIG. On the performance WISC, neither visual motor association nor visual association correlate significantly. On the DURRELL, visual motor association correlates with oral reading, silent reading, flash words, word analysis, and sounds, but visual association does not correlate significantly with any part of the DURRELL.

Motor encoding of the 1968 ITPA is compared with manual expression of the 1968 ITPA on correlations with the performance WISC. Manual expression correlates with picture arrangement, object assembly, and total performance. Both manual expression and motor encoding correlate with full scale score.

Auditory vocal automatic of the 1961 ITPA is compared with grammatical closure of the 1968 ITPA on correlations with the verbal WISC and the WEPMAN. On the verbal WISC, auditory
vocal automatic and grammatical closure correlate with information. Auditory vocal automatic correlates with arithmetic, similarities, vocabulary, total verbal, and full scale score. On the WEPMAN, auditory vocal automatic shows a significant negative correlation, but grammatical closure does not correlate significantly.

Auditory vocal association of the 1961 ITPA is compared with auditory association of the 1968 ITPA on correlations with the verbal WISC and the WEPMAN. On the verbal WISC, auditory vocal association and auditory association correlate with information, similarities, vocabulary, total verbal, and full scale score. Auditory vocal association correlates with comprehension and arithmetic. On the WEPMAN, auditory vocal association shows a significant negative correlation, but auditory association does not correlate significantly.

Vocal encoding of the 1961 ITPA is compared with verbal expression of the 1968 ITPA on correlations with the verbal WISC. Vocal encoding correlates with all of the verbal and full scale score of the WISC, but verbal expression does not correlate significantly with the verbal WISC.

Auditory decoding of the 1961 ITPA is compared with auditory reception of the 1968 ITPA on correlations with the verbal WISC and the WEPMAN. On the verbal WISC, auditory decoding and auditory reception correlate with information, arithmetic, total verbal, and full scale score. Auditory decoding correlates with similarities, and auditory
reception correlates with comprehension and vocabulary. On the **WEPMAN**, neither auditory decoding nor auditory reception correlate significantly.

Auditory vocal sequential of the 1961 **ITPA** is compared with auditory memory of the 1968 **ITPA** on correlation with the **WEPMAN**. Auditory vocal sequential shows a significant negative correlation, but auditory memory does not correlate significantly with the **WEPMAN**.

The total score of the 1961 **ITPA** correlates significantly with all of the **FROSTIG**, except eye-hand coordination; all of **WISC**, except object assembly; and all of the **DURRELL**. The total 1961 **ITPA** shows a significant negative correlation with **WEPMAN**.

The total score of the 1968 **ITPA** correlates significantly with form constancy, spatial relationships, and perceptual quotient of the **FROSTIG**; all of the **WISC**, except arithmetic, picture completion, block design, and coding; and only silent reading of the **DURRELL**. The total 1968 **ITPA** does not show a significant correlation with the **WEPMAN**.

**Conclusions**

From the results of this study it would appear that some of the subtests and total test scores of the 1961 and 1968 **ITPA** can be used reliably as predictors of achievement on some of the subtests and total test scores of the **WISC**, **FROSTIG**, **DURRELL**, and **WEPMAN**.
The discussion of the results of this study has included all correlations at the .05 and .01 levels of significance. It is suggested that the test administrator direct his attention to the correlations at the .01 level of significance if he is interested in observing check points on the ITPA that might reliably predict performance on some part of the WISC, FROSTIG, DURRELL, or WEPMAN.

Five of the ten subtests and the total test scores on the 1968 ITPA correlate positively at the .01 level of significance with parts of the above tests. Such correlations should indicate some interesting conclusions. The auditory reception subtest could suggest achievement on the arithmetic, vocabulary, total verbal, and full scale score of the WISC. The visual reception subtest could be an indication of performance on the picture arrangement, total performance, and full scale score of the WISC. The auditory association subtest could be a check point for predicting the score on the information and similarities subtests, total verbal, and full scale score of the WISC. The manual expression subtest could suggest achievement on the picture arrangement and full scale score of the WISC. The grammatical closure subtest might indicate performance on the information subtest of the WISC. The total score on the ITPA also correlates positively at the .01 level with the vocabulary, total verbal, picture arrangement, total performance, and full scale score of the WISC and form constancy and spatial relationships of the
FROSTIG. Neither grammatical closure, auditory association, auditory memory, auditory reception, nor total test scores of the ITPA correlate significantly with the WEPMAN.

Six of the nine subtests and the total test scores of the 1961 ITPA show significant positive correlations at the .01 level with parts of the WISC, FROSTIG, and DURRELL. The auditory vocal automatic subtest could be indicative of achievement on the information, arithmetic, similarities, and vocabulary subtests, total verbal, and full scale score of the WISC. The visual decoding subtest might suggest performance on the block design and full scale score of the WISC and flash words, word analysis, and visual memory of the DURRELL. The auditory vocal association subtest might anticipate achievement on the information, arithmetic, similarities, and vocabulary subtests, total verbal, and full scale score of the WISC. Performance on the visual motor sequential subtest could indicate scoring on the coding and full scale score of the WISC and oral reading and silent reading of the DURRELL. The vocal encoding subtest score might predict achievement on the information, similarities, and vocabulary subtests, total verbal, and full scale score of the WISC. Scoring on the auditory vocal sequential subtest could indicate scoring on the full scale score of the WISC and listening, spelling, and sounds on the DURRELL.

Finally, the total ITPA score indicates a positive correlation at the .01 level with the total verbal, total performance, and
full scale score of the WISC, all of the subtests on the DURRELL, and figure ground, form constancy, and perceptual quotient of the FROSTIG. The auditory vocal automatic, auditory vocal association, and total test scores show significant negative correlations at the .01 level with the WEPMAN.

Continuing with the summary of the correlations that were significant at the .01 level, examination of the information also provides a comparison of the 1961 and 1968 ITPA. Out of a possibility of twenty-four correlations, the 1961 ITPA shows three and the 1968 ITPA shows two positive significant correlations with the FROSTIG. With a possible thirty correlations, the 1961 ITPA shows twenty and the 1968 ITPA shows nine positive significant correlations with the verbal section of the WISC. Out of another possible thirty correlations, the 1961 ITPA shows four and the 1968 ITPA shows five positive significant correlations with the performance section of the WISC. Six out of nine subtests and the total test scores of the 1961 ITPA and four out of ten subtests and the total test scores of the 1968 ITPA show significant positive correlations with the full scale score of the WISC. Out of a possibility of thirty-two correlations, the 1961 ITPA shows thirteen significant positive correlations and the 1968 ITPA shows no significant correlations with the DURRELL. With a possible five correlations, the 1961 ITPA shows three significant
negative correlations and the 1968 ITPA shows no significant correlations with the WEPMAN.

The results of this study would seem to reveal some grounds for similarity and comparison between both the 1961 and 1968 ITPA and the WISC, FROSTIG, DURRELL, and WEPMAN. The visual, auditory, motor, and vocal tasks found on these tests involve comprehension, discrimination, perception, memory or recall, performance, association, sequencing, decoding, and encoding and appear to be evaluating similar skills when compared from one test to another. When sub-tests, involving similar skills, and total test scores are compared, both the 1961 and the 1968 ITPA appear to exhibit a degree of predictability of performance on the WISC, FROSTIG, DURRELL, and WEPMAN.
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