

The University of North Carolina
at Greensboro

JACKSON LIBRARY



GQ

no.817

Gift of:
Sally Morris Randall

COLLEGE COLLECTION

RANDALL, SALLY MORRIS. A Study of Psycholinguistic Abilities in Inadequate Readers. (1971) Directed by: Dr. Mariana Newton. Pp. 79.

Psycholinguistics, the psychological study of language, is the science of the expression, reception, and integration of language and their complex interrelationships. Reading, a complex psycholinguistic process, has received national attention due to the failure of some children to adequately learn this important language skill. This study was designed to delineate psycholinguistic abilities which may affect reading achievement.

Thirty children, eight to ten years of age, were selected for study on the basis of reading-related scores on the Stanford Achievement Test. The Illinois Test of Psycholinguistic Abilities (Revised, 1968) was administered to selected children according to standardized procedure and the resulting scores were analyzed statistically.

Analysis of variance, using a subject by treatments repeated measurement design, revealed a significant difference (.01) between inadequate readers and the theoretical normal expectancy on the Illinois Test of Psycholinguistic Abilities, 1968, (ITPA). Specifically, inadequate readers scored significantly lower on these subtests: auditory reception, auditory association, visual association, manual expression, and visual sequential memory. Contrary to previous studies, the results of this study indicate that inadequate readers score significantly lower than the theoretical normal expectancy on representational level tasks, while at the automatic level no significant differences were found. The findings are discussed and inferences made regarding the nature of language skills involved in the reading process.

A STUDY OF THE PSYCHOLINGUISTIC ABILITIES
OF INADEQUATE READERS

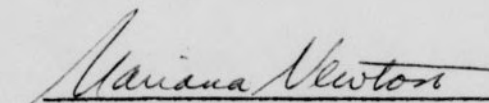
by

Sally Morris Randall

A Thesis Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Master of Arts

Greensboro
1971

Approved by


Thesis Adviser

APPROVAL SHEET

This thesis has been approved by the following committee of the Faculty of the Graduate School at The University of North Carolina at Greensboro.

Thesis
Adviser

Mariana Newton

Oral Examination
Committee Members

Floyd L. Lark
Hal W. Eunk

April 15, 1971
Date of Examination

ACKNOWLEDGEMENTS

The investigator wishes to express her appreciation to the public schools of Greensboro, North Carolina where subjects were located and where facilities were provided for this study.

Appreciation is extended to members of the investigator's graduate committee, Dr. Floyd Earle and Dr. Hal Funk, for their suggestions and criticisms.

Special recognition is extended to Dr. Mariana Newton, who directed this study, for her countless hours of assistance and for her guidance and friendship.

Finally, the writer wishes to express appreciation to her family, and especially to her husband, Chal Randall, who assisted in the statistical analysis of the data.

TABLE OF CONTENTS

CHAPTER	Page
I. INTRODUCTION	1
II. REVIEW OF THE LITERATURE	10
Psycholinguistics.	11
The Illinois Test of Psycholinguistic Abilities.	13
The Illinois Test of Psycholinguistic Abilities and Reading Disabilities.	28
III. PROCEDURE.	35
Statement of the Hypothesis.	36
Selection of the Subjects.	37
Test Administration.	40
IV. RESULTS.	42
V. DISCUSSION	49
The Automatic and Representational Levels of the ITPA.	49
Subtests Distinguishing Inadequate Readers	52
Subjective Judgments Regarding the Supplementary Subtests.	62
VI. SUMMARY AND CONCLUSIONS.	67
BIBLIOGRAPHY	69
APPENDIX	74

LIST OF TABLES

TABLE	Page
1. Analysis of Variance Comparing the Mean Scaled Scores of Thirty Inadequate Readers on the Twelve Subtests of the Illinois Test of Psycholinguistic Abilities.	43
2. Summary of t Testing the Differences Between the Theoretical Normal Expectancy and Thirty Inadequate Readers on Twelve Subtests of the Illinois Test of Psycholinguistic Abilities	45
3. Summary of t Testing the Differences Between the Theoretical Normal Expectancy and Thirty Inadequate Readers on Two Levels of the Illinois Test of Psycholinguistic Abilities: Representational and Automatic	46
4. Scores of Thirty Inadequate Readers on Selected Subtests of the Stanford Achievement Test.	75
5. Scores of Thirty Inadequate Readers on the Illinois Test of Psycholinguistic Abilities (Revised, 1968) . . .	76

CHAPTER I

INTRODUCTION

Psycholinguistics, the psychological study of language, is the science of encoding, or expression (speaking and writing); decoding, or reception (reading and listening); and integrative language (perception and internal reflection). These processes have complex interrelationships.

Recent emphasis in psycholinguistics concerns oral expression (speech) as well as written expression (reading). Psycholinguistics involves the study of speech (oral language) and the levels of acquisition of language learning in the child. Psycholinguists are discovering the oral language skills which exist in the early years, how these skills can be developed, and what language the child possesses when he enters school. The need for linguistic code objectives in oral language in the developmental years is becoming increasingly important.¹ Reading, also a psycholinguistic process, involves auditory and visual skills, receptive and expressive skills, sound-blending skills, and grammatical and syntactical skills. Recently the confusion and deficiencies in teaching children to read have received national attention. Insight is needed in which the

¹Barbara S. Wood, "Implications of Psycholinguistics for Elementary Speech Programs," The Speech Teacher, XVII (September, 1968), p. 184.

field of speech and language therapy can contribute to helping a child learn to read.

Reading and speech are interrelated parts of total language development. The knowledge of psycholinguistic principles for remediating disorders in reading can be useful to the speech pathologist, whether his work is in the more pathological areas found in a clinical situation, or whether he is associated with speech education in the schools. The same phonic, phonetic, and linguistic word-recognition skills used in reading instruction can be integrated into articulation therapy in the field of speech pathology.¹ Speech and language therapy with an aphasic child or adult involves kinesthetic, tactual, auditory, and visual stimulation² similar to that used in the visual sight-word and kinesthetic-tactual methods of reading instruction. Drill in grammatical and syntactical structures used in language therapy with the mentally retarded, learning disabled, and culturally deprived are also used in basic reading instruction.³ A theory regarding the cause of stuttering is related to unrealistic demands upon the child with

¹Wilbert Pronovost, "Creating Teaching Materials and Curricula", in An Introduction to Graduate Study in Speech and Theatre, ed. by Clyde W. Dow (East Lansing, Mich.: Michigan State University Press, 1961), p. 163.

²H. Schuell, J. Jenkins, E. Jimenez-Pabon, Aphasia in Adults: Diagnosis and Treatment (New York: Harper & Row, 1967), p. 170.

³Doris J. Johnson and Helmer R. Myklebust, Learning Disabilities: Educational Principles and Practices, (New York: Greene and Stratton, 1967), p. 1.

poor pronunciation, articulation, and word-attack skills in oral reading in the early grades.¹ A similar "mouth geography", or phonetic placement, used in speech reading with the hard of hearing and deaf is useful in a phonic approach to beginning reading instruction.² Many textbooks written specifically for reading instruction list the identical materials as do some speech pathology textbooks for diagnosing and treating speech problems.

The child learns his language first as a listener and speaker, influenced by radio and television as no preceding generation has been. The child today has an extensive language ability obtained by simultaneously hearing and seeing television, or other mass media. He has not seen the equivalent words. His task in learning to speak is to integrate the sounds which he has heard; his task in learning to read is to learn the printed symbols by which this spoken language is recorded. Learning to read is learning to associate known and understood oral language with the symbols appearing in written form.³

The controversy over "why Johnny can't read" cannot be blamed upon a lack of research and study concerning the nature of the language arts and the developmental reading process over the years. The studies are comprehensive, especially those done in the last decade.

¹Oliver Bloodstein, "Stuttering as an Anticipatory Struggle Reaction" in Stuttering: A Symposium, ed. by Jon Eisenson (New York: Harper & Row, 1958), p. 27.

²Emile Dechant, Linguistics, Phonics and The Teaching of Reading (Springfield, Ill.: Charles C. Thomas, 1969), p. 17.

³Helen L. Wardeberg, The Teaching of Reading (Albany, New York: Bureau of Curriculum Development, 1965), p. 1.

At present, the controversies in reading are still many, but there is one common agreement in most current literature: phonics is no longer a major issue in a good reading program. Most structured approaches to reading suggest teaching phonics in one way or another. Most approaches stress the importance of obtaining meaning as well as obtaining phonic skills.¹

Definitions of terms referring to the teaching of reading have similarity to some of the terms referring to methods of teaching sounds in speech therapy. Dechant, in Linguistics, Phonics, and the Teaching of Reading, defines some of these terms:²

Phonics is the study of speech equivalents of printed symbols and the use of this knowledge in identifying and pronouncing words. It is learning which involves the association of the appearance of a letter or letter combinations with a given sound, the study of sound-letter relationships in reading and spelling.

Phonic Analysis is the actual process of sounding out letters or letter combinations to arrive at the pronunciation of a word.

Phonetics is the study of the sounds used in speech, including their pronunciations, the symbolizations of sounds, and the action of the larynx, tongue, and lips in sound production.

¹Dechant, Linguistics, Phonics and the Teaching of Reading, p. 6.

²Ibid., p. 6.

Linguistic phonics is the structure of the language as studied through symbol-sound relationships in whole words.

Whole-word phonics is the study of whole-word sounds, (rat, can, bat), which is advocated by linguists.

Phonemics is the study of the speech sounds used in language; a phoneme is the smallest unit of sound in a language.

Word analysis refers to all methods of attacking words.

The previous definitions are found in a publication primarily concerned with the teaching of reading. The following definitions primarily concerned with speech therapy show the similarity of the terms used to refer to learning sounds in reading and speech:¹

Auditory training is a method used in articulation therapy which teaches the child to listen for speech sounds. This method begins with listening to a phoneme in isolation, in syllables, in words, and in sentences.

Speech reading teaches the child visually the articulatory movements accompanying contrasting sounds, such as /f/ and /θ/.

Tactual feedback training teaches the child to sense the contact made by his tongue, teeth and lips.

Speech sound or auditory discrimination teaches the child to hear contrast in phonemes.

¹Charlotte S. Perkins, "Survival Kit for Student Therapists and Co-operating Teachers" (unpublished manual, University of North Carolina at Greensboro, 1969).

Kinesthetic feedback training teaches the child to recognize muscle tension and the movement of the articulators.

Sensory-motor training is the method designed to train the sense of motor movement involved in connected speech.

Stimulation is therapy through auditory and visual bombardment with the consonant sounds: looking, listening, and imitating by the child.

Imitation is the method used if the therapist asks the individual to imitate the therapist's production of a sound.

Many different methods in reading instruction do eventually lead to reading proficiency. The method that works best depends upon the individual child, as well as teacher effectiveness. However, some of the most familiar approaches are: sight word method (visual memorization of words); auditory, phonetic, phonic, and linguistic methods (particular attention to some type of analysis of sounds in attacking words); combination method (combining auditory and/or visual methods with other approaches); tactual-kinesthetic method (a method utilizing tracing and motor-skill co-ordination); programed instruction methods (teaching machines or workbooks based on the learning theory of self-direction for success); the i.t.a. (a phonetic teaching alphabet); and the language-experience method (an eclectic approach emphasizing language and communication).

The language experience approach to reading makes no distinction between the development of reading skills and the development of listening, speaking, spelling, and writing skills. This method should

be of interest to speech educators. All experiences of a child which he can express in oral language are the material out of which reading grows. The child learns that what he can think, he can express in speech; what he can express in oral language, he can read.¹

Language is a means by which thought is organized as well as a major means through which it is expressed. Children and adults increase their power of meaning and concepts in language, through rich experiences. The language that a child hears and uses influences his development. Language is a code that represents the learned behavior of a social community. The function of language is to communicate; communication is the primary purpose of language. If language usage, either oral or written, is to be taught effectively, the teaching must be based on the functional use of language--communication.²

In the complex area of verbal communication there are few boundaries. Language learning extends into the fields of physics, physiology, neurology, chemistry, psychology, linguistics, phonetics, mathematics, and education.

Language is the universal cross-reference. One must be informed about the physical phenomena associated with the perception of speech. He must reckon with the influence of endocrines on emotional stability. He must understand the integrative action of the reticular and limbic systems in coding languages, the chemical shifts in synaptic potentials, the psychological bases of coding,

¹Roach Van Allen, "How a Language-Experience Program Works", in a Decade of Innovations: Approaches to Beginning Reading, ed. by Elaine Vilscek (Proceedings of 12th Annual Convention: International Reading Association, 1968), p. 1.

²Ibid., p. 1.

of attention and memory, the morphemological approach to sound sequences, the morphological principles of language learning, and the marshalling of large sequences for oral expression. . . Thus the lengthy discussions of the psychoneurological, psycholinguistic, and psychosocial dimensions of language behavior are well justified.¹

From a neurological point of view, lesions in the language center may retard both the ability to speak and to read. These abilities are closely related. The speech center and the center of other motor processes involved in reading are located in the language center on the left side of the brain.²

Kass, in investigating the process of reading and its logical relationship to the developmental process within the child, found the reading process to be primarily a communication process. If we consider reading to be a communication process (i.e. the development of a system of informational input, integration, and output), then it should be possible to develop a theoretical structure which would account for deviations from normal development of language and communication processes.³

Perhaps a narrow concept of "speech" should be avoided when considering psycholinguistics and language development in the elementary school program. In speech education particularly, a merging of the two disciplines, psycholinguistics and speech education,

¹Mildred F. Berry, Language Disorders of Children: The Bases and Diagnoses (New York: Appleton-Century-Crofts, 1963), p. 129.

²Homer Carter and Dorothy J. McGinnis, Diagnosis and Treatment of the Disabled Reader (London: The MacMillan Co., 1970), p. 53.

³Corrine E. Kass, "Psycholinguistic Disabilities of Children with Reading Problems", Exceptional Children, XXXII (April, 1966), pp. 533-539.

would improve the elementary oral language curriculum.¹

Thus, a study of the processes involved in any one of the language modes may provide useful information to the speech pathologist in the general understanding of language and psycholinguistic development and disabilities. Also, a study of these language processes may provide information useful in remediation of reading disabilities, in strengthening developmental reading skills, and in integrating speech and reading skills.

¹Wood, "Implications of Psycholinguistics for Elementary Speech Programs", p. 192.

CHAPTER II

REVIEW OF THE LITERATURE

The possibility that the Revised Edition of the Illinois Test of Psycholinguistic Abilities (1968) may provide useful information regarding the nature of language deficits in children with reading problems is proposed. In order to understand the test, as well as its evaluative and prescriptive usefulness, several areas of the literature will be reviewed. In this chapter information regarding the field of psycholinguistics will be summarized, followed by a review of the model and structure of the Illinois Test of Psycholinguistic Abilities (ITPA). A general discussion of the previous studies using the ITPA will be given. Finally, the literature concerning the use of the ITPA in assessing psycholinguistic abilities of children with reading problems will be reviewed.

The ITPA, while still in an experimental edition, has received attention as a useful screening instrument in the discovery of psycholinguistic disabilities and as an aid to remedial planning. The test has been used extensively in schools and clinics throughout this country and abroad. Moreover, the ITPA has been used in research with reading-disabled children, mentally retarded children, culturally disadvantaged children, Negro children, children with articulation defects, and other exceptional children (i.e., aphasic, cerebral palsied,

visually handicapped, and the gifted).

Psycholinguistics

Interest in the psychological study of language behavior today can be traced to a psycholinguistics monograph written by Charles E. Osgood in 1954. Aided by learning theorists, communication engineers, and descriptive linguists, Osgood's monograph explored the general area of human communication. Osgood describes psycholinguistics as the science of encoding and decoding processes in individual communicators. Encoding processes are involved in language expression and decoding processes in language reception:

It [the model] envisages two stages and three levels of organization between stimulus and response in the complete behavioral act. The first stage is what I shall call decoding, the total process whereby physical energies in the environment are interpreted by an organism. The second stage is what I shall call encoding, the total process whereby intentions of the organism are expressed and hence turned again into environmental events. The three levels of organization are assumed to apply to both sides of the behavioral equation, to both decoding and encoding: (1) a projection level of organization, which relates both receptor and muscle events to the brain via "wired-in" neural mechanisms; (2) an integration level, which organizes and sequences both incoming and outgoing neural events; and (3) a representational or cognitive level, which is at once the termination of decoding operations and the initiation of encoding operations.¹

¹S. A. Kirk and J. J. McCarthy, "The ITPA--An Approach to Differential Diagnosis", American Journal of Mental Deficiency, LXVI (November, 1961), p. 400. Quoting Charles E. Osgood, Contemporary Approaches to Cognition (Cambridge: Harvard University Press, 1957).

According to Rosenberg and Koplin, the definition of encoding and decoding is usually interpreted to include the following:

. . . studies of (1) the influence of verbal and nonverbal antecedent conditions upon verbal behavior and verbal learning, (2) the influence of verbal stimuli upon nonverbal behavior and learning, (3) the role of verbal mediators in behavior, (4) inter-relationships among various dimensions of verbal response, (5) relationships between verbal and nonverbal response dimensions, (6) language acquisition and language development, and (7) strictly normative reports of language behavior.¹

The practical problems of the construction of the ITPA by Kirk and McCarthy necessitated some alterations in Osgood's theoretical model to give greater applicability to the field of remedial education. In analyzing behavior which occurs in the acquisition and use of language, Kirk and McCarthy give three main psycholinguistic processes which are considered in the ITPA: (a) the receptive process, that is, the ability necessary to recognize or understand what is seen and heard; (b) the expressive process, that is, those skills necessary to express ideas or to respond either vocally or by gesture or movement; (c) an organizing process which involves the internal manipulations or percepts, concepts, and linguistic symbols.²

Psycholinguistics can also be defined as the study of symbolic activity required to produce and understand natural languages. The problem of the psycholinguist is to characterize a child's grammar,

¹Sheldon Rosenberg and James H. Koplin, "Introduction to Psycholinguistics," in Directions in Psycholinguistics, ed. by Sheldon Rosenberg, (New York: MacMillan Co., 1965), p. 4.

²Samuel A. Kirk, James J. McCarthy, and Winifred D. Kirk, Examiner's Manual, ITPA, Revised Edition (Urbana, Illinois: University of Illinois, 1968), p. 7.

over a period of developmental stages. Noting changes in a child's grammar, over a period of time, is a way of categorizing the child's linguistic growth.¹

The Illinois Test of Psycholinguistic Abilities

In the last decade, much attention has been given to the variation of abilities in the individual child. Over the years, many children erroneously have been labeled mentally retarded, lazy, and emotionally disturbed even though there were wide discrepancies in the child's abilities.

Standard tests of achievement did not show why the child was not performing at grade level. Standardized intelligence tests such as the Revised Stanford Binet and the Wechsler Intelligence Scales for Children were used frequently for overall classification of global intelligence; the individual subtests of these tests provide some specific information, but methods of reporting the results of these tests vary. Some psychologists report subtest results; others place more importance on the overall intelligence quotient.

The ITPA evolved because of the need for a psycholinguistic psychometric instrument which would specify particular areas of a child's language performance. The ITPA was designed to provide a diagnostic instrument in symbolic and nonsymbolic psychological

¹Wood, "Implications of Psycholinguistics for Elementary Speech Programs", p. 184.

processes which would give clues to remediation.¹

In 1961, the ITPA was published in an experimental edition as a diagnostic test of communication abilities. A revised edition, published in 1968, incorporated additions and modifications in format and content, although the object of this revised edition was to find specific abilities and disabilities in children in order to define a program of remediation. Some principles of interpretation used with reference to the 1961 edition are believed to be directly applicable also to the 1968 edition of the test.² Further research with the 1968 ITPA will give insight into additional interpretations.

The Model of the Illinois Test of Psycholinguistic Abilities

The experimental edition of the ITPA, published in 1961, has been recognized as a useful instrument in clinical work and research. In 1965, a more complete test based on the same model and construction as the 1961 version was begun. The results of the revision were published in 1968 as the revised edition of the ITPA.

The psycholinguistic model on which the ITPA is based attempts to relate those functions whereby the intentions of one individual are transmitted (verbally or nonverbally) to another individual, and, reciprocally, functions whereby the environment or the intentions of another individual are received and interpreted. It attempts to interrelate the processes which take place, for example, when one person receives a message, interprets

¹Kirk, McCarthy, and Kirk, Examiner's Manual, Revised Edition, p. 5.

²Barbara D. Bateman, Interpretation of the Illinois Test of Psycholinguistic Abilities (Seattle, Washington: Special Child Publication, 1968), p. 6.

it, or becomes the source of a new signal to be transmitted. It deals with the psychological functions of the individual which operate in communication activities.¹

Many publications contain descriptions of the model of the ITPA.² The most current is the description of the test in the 1968 Revised Examiner's Manual.³ McCarthy, with Kirk, published the statistical details concerning the 1961 test with comments describing the choice of materials and subject matter for each subtest.⁴ Paraskevopoulos and Kirk have updated the latest statistical information concerning the 1968 ITPA.⁵ The following description of the model is based on information in the 1968 Examiner's Manual:

- I. The present model of the ITPA⁶ postulates three dimensions of cognitive abilities: channels of communication, psycholinguistic processes, and levels of organization.
 - A. The channels of communication are routes through which communication flows.

¹John N. Paraskevopoulos and Samuel A. Kirk, The Development and Psychometric Characteristics of the ITPA (Urbana, Illinois: University of Illinois Press, 1969), p. 11.

²Samuel A. Kirk, Diagnosis and Remediation of Psycholinguistic Abilities, (Institute for Research on Exceptional Children: University of Illinois Press, 1966), pp. 49-65.

³Kirk, McCarthy, and Kirk, Examiner's Manual, Revised Edition, pp. 5-13.

⁴James J. McCarthy and Samuel A. Kirk, Construction, Standardization, and Statistical Characteristics of the ITPA (Urbana, Illinois: University of Illinois, 1963), pp. 1-13.

⁵Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the ITPA, pp. 11-181.

⁶The model of the ITPA is presented here in outline form for the purpose of clarity.

1. The major channels of input are auditory and visual.
 2. The channels of output are vocal and motor.
- B. There are three psycholinguistic processes.
1. The receptive process involves understanding what is seen and heard.
 2. The expressive process involves the vocal response by gesture or movement to what is seen and heard.
 3. The organizing process involves inner management of concepts and words.
- C. The levels of organization show which level of functioning the individual uses to communicate.
1. The representational level (symbolization) involves the use of symbols of meaning.
 2. The automatic level (nonsymbolic) is a habitual or rote level of functioning.
- II. The functions tested at the representational level are the receptive process, the organizing process, and the expressive process.
- A. The receptive process (decoding) tests the ability to comprehend auditory and visual symbols.
1. The auditory reception subtest assesses the ability to understand speech. The child is asked, "Do dogs eat?", "Do carpenters kneel?", in order to elicit a "yes" and "no" response.
 2. The visual reception (decoding) subtest evaluates the child's ability to gain meaning from pictures.

B. The organizing process (association) is at the representational level and involves the ability to report and organize visual or auditory symbols in a meaningful way.

1. The auditory-vocal association subtest checks the ability to relate spoken words in a meaningful way, (e.g., "Soup is hot; ice cream is _____").
2. The visual-motor subtest assesses the ability to relate visual symbols in a meaningful way. The subject is required to relate pictures of common objects to a stimulus picture.

C. The expressive process, at the representational level, involves the ability to use verbal or manual symbols to transmit an idea.

1. The verbal expression (vocal encoding) subtest assesses the ability to express concepts vocally. The child is shown four familiar objects (ball, block, envelope, button) and is asked to tell the examiner about the object.
2. The manual expression (motor encoding) subtest taps the child's ability to express ideas manually.

III. The functions tested at the automatic level are closure and sequential memory.

A. Closure assesses the child's ability to complete the missing parts in a picture or expression.

1. The grammatic closure subtest attempts to elicit the child's automatic response. When a grammatic form is

presented, the child supplies the missing work, (e.g., "Here is a dog; here are two ____").

2. In the auditory closure subtest, the child is asked to fill in the sound in a word, (e.g., airpl__).
 3. In the sound blending subtest, the sounds of a word are spoken separately. The child is asked to combine the sounds, (e.g., "duh-aw-guh" is dog).
 4. The visual closure subtest assesses the ability to identify a common object from an incomplete picture.
- B. The sequential memory subtests check the child's ability to reproduce a sequence of auditory or visual stimuli. They are tests of short-term sequential memory.
1. The auditory sequential memory subtest assesses the child's ability to reproduce, from memory, sequences of digits up to eight digits.
 2. The visual sequential memory subtest taps the child's ability to reproduce sequences of nonmeaningful figures from memory.

According to Kirk and Paraskevopoulos, this model can aid in designing a curriculum for young children. The basic instructional methods which a teacher uses resemble in theory the model of the ITPA. First, the teacher uses visual and auditory stimuli to instruct. In this way, verbal, motor and manual responses are encouraged. Second, material presented visually and orally involves seeing and understanding relationships--auditory closure, visual closure, auditory and visual

sequential memory. Finally, much of the verbal action of teacher and class involves auditory and automatic functions. At the cognitive, or representational level of instruction the child must first understand what the teacher is saying to him (auditory reception); see what is being shown him (visual reception); relate his thoughts to past experiences (visual association) and answer verbally (verbal expression).¹

Standardization and Reliability of the Illinois Test of Psycholinguistic Abilities

The revised edition of the ITPA was standardized on 962 children between the ages of two years and ten years of age. School age subjects were randomly selected from a list of all school children in four communities in Illinois and one community in Wisconsin. The sample of preschool children were siblings of the school subjects. The intelligence quotient of the standardization population was average, as measured by the Stanford Binet Intelligence Scale (Form L-M, Short). Four percent of the children were Negro. The same number of males and females were included in the study. Socio-economic characteristics were determined by classification of the father's income, occupation, and school records. All subjects were middle-class children. They were judged to be physically normal with intact sensory and motor development.²

¹Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the Revised ITPA, p. 24.

²Ibid., pp. 50-72.

The ITPA reliability data was analyzed for (a) internal consistency, (b) stability, (c) reliability of difference score, (d) and standard errors of measurement. Information was also gathered on interscorer reliability for verbal expression and reliability of data with a sample of educable mentally retarded children. Reliability data was recorded for the twelve ITPA subtests, the ITPA composite, and for "difference scores between subtests". Though the reliability scores vary for each subtest, the ITPA is considered to be a reliable instrument for measuring psycholinguistic abilities. Further research with the revised edition will determine the degree of reliability in assessing problems for remediation.¹

Studies Using the Illinois Test of Psycholinguistic Abilities

The 1961 ITPA has been used in hundreds of research projects in schools, clinics, and university training programs since its origination in 1960. The foremost authorities in research using the ITPA are Barbara D. Bateman, Samuel A. Kirk, and James J. McCarthy. Overall research findings have been presented by Bateman in 1965², in 1968³, and by Kirk in 1966.⁴ Studies have been done with all types of exceptional children: mentally retarded, cerebral palsied, articulatory defective, gifted, learning disabled, visually

¹Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the ITPA, p. 95, 97.

²Barbara Bateman, The ITPA in Current Research: Summaries of Studies (Urbana, Ill: University of Illinois Press, 1965).

³Bateman, Interpretation of the 1961 ITPA, 1968.

⁴Kirk, Diagnosis and Remediation of Psycholinguistic Abilities, 1966.

defective, culturally disadvantaged, aphasic, psychotic, reading disabled, and other types of psycholinguistic problems.

The bibliography compiled by Bateman included studies using the experimental ITPA from 1960 to 1967. Listed were five general publications concerning construction and origination of the test by Kirk, McCarthy, Osgood, and Wepman, et al.; fourteen monographs and chapters concerning the ITPA; sixty-two articles and papers referring to usage of the ITPA; fourteen research reports; and fifteen unpublished theses and doctoral dissertations. Bateman's bibliography refers to the 1961 edition of the ITPA. The most comprehensive evaluation of the revised edition of the ITPA is the previously mentioned monograph concerning the psychometric characteristics of the ITPA. This monograph does not include any summaries or review of studies concerning the 1968 revised edition of the ITPA.¹ Research concerning the revised edition is in progress.

The ITPA was especially designed to provide information concerning remedial procedures which should be used with the child whose difficulties are being diagnosed. The purpose of the test is to tell the examiner something about the nature of the educational needs of the child.

The two major categories of the test, representational level and automatic level, are important in a review of previous studies

¹Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the Revised ITPA, 1969.

using the ITPA. Much of the research literature of the ITPA and the studies of profiles reveals that there are patterns of disabilities or abilities in different types of exceptional children. The patterns of these profiles in the 1961 ITPA involve the representational level (auditory reception, visual reception, auditory association, visual association, verbal expression) and the automatic level (grammatical closure, auditory sequential memory, and visual sequential memory.)¹ Entire groups of children with learning problems show disabilities at one of these levels. Most groups of children with psycholinguistic problems show disabilities at the automatic level.²

Children with reading problems have more difficulty at the automatic level than at the representational level. Mentally retarded children appear to be more defective at the automatic level than at the representational level. Athetoid cerebral palsied children are more defective at the automatic level than at the representational level, whereas spastic cerebral palsied children show the opposite trends. Children with articulation defects have a slight deficit in the automatic level in general profile research. Automatic scores (auditory-vocal) are an area of weakness in the profiles of culturally disadvantaged Negro children, since the scoring is based on the grammatical patterns of the white standardization sample. Intellectually

¹The definitions are those found in the 1961 ITPA, since published research refers to the 1961 ITPA. These differences will be discussed in Chapter III.

²Bateman, Interpretation of the 1961 ITPA, pp. 22-54.

gifted children usually score higher on the representational level of the test.¹

These results which show tendencies indicated above cannot be applied to each individual case. Mentally retarded children are not all defective at the automatic level. One cannot diagnose an etiology from a profile. The value and use of the present form of diagnosis is that it requires the clinician to diagnose the individual child behaviorally and to organize remedial procedures, regardless of the classification, etiology, overall mental age, language age, or intelligence quotient.²

The case study approach has been used extensively with the ITPA because of the individualized nature of the profile, and it's purpose of remedial planning. One of the most comprehensive reports has been done by Kirk with the following individual cases: severe delayed language, mentally retarded, expressive disability, reading and auditory disability, central nervous system dysfunction, and other involvements. Kirk makes tentative generalizations and summaries from these studies with the ITPA: (1) some children classified as mentally retarded might be classified as children with learning disabilities, though the two classifications are not mutually exclusive; (2) remediation is effective in ameliorating psycholinguistic deficits; (3) remediation of psycholinguistic disabilities affects the

¹Bateman, Interpretation of the 1961 ITPA, pp. 22-54.

²Kirk, Diagnosis and Remediation of Psycholinguistic Abilities, p. 44.

intelligence quotient in preschool children greater than in children of school age; and (4) children with psycholinguistic disabilities form a heterogeneous group, and appropriate remediation varies from one case to another.¹

Many studies have been done with different types of retarded or slow-learning children, and these children appear to be more defective at the automatic level. There are important educational implications to be derived from the knowledge that the basic deficit in retarded children is in the automatic, habitual, or rote aspects of learning. The retarded child needs repetition, over-learning, and mechanical drill in learning, according to Bateman. "A danger in current designs to make all learning situations meaningful to the child is that by so doing, the retarded child will handle these tasks at the representational level exclusively."²

Children with articulation defects have a slight deficit in the automatic level in general profile research with the ITPA. A slight deficiency across the entire auditory vocal channel is also suggested in the profile. Language specialists have considered articulatory defects to be the result of poor perception of the linguistic form of the sentence. Bateman³ and Ferrier⁴, in studies

¹Kirk, Diagnosis and Remediation of Psycholinguistic Abilities, p. 72.

²Bateman, Interpretation of the 1961 ITPA, p. 23.

³Ibid., p. 26.

⁴E. E. Ferrier, "An Investigation of the ITPA Performance of Children with Functional Defects of Articulation," Exceptional Children, XXXII (May, 1966), p. 629.

using the ITPA, have shown a language deficit in some children having articulatory defects. Berry has found that articulation problems are not the inability to produce isolated sounds, but inability to produce sound sequences.¹ Research findings indicate that neurological or psychological blocks may have disrupted the integrative language process in a child with articulation problems. Many disabilities previously not diagnosed as language disabilities are being categorized as such in view of current research in the importance of language learning.

The ITPA has been used in socio-economic status studies with kindergarten children. The higher socio-economic level children scored higher in auditory-vocal association, which is highly correlated with the Stanford-Binet mental age. The lower socio-economic level children showed a dip in the automatic level. A preference for the visual channel is clear in profile studies of disadvantaged Negro children. These children need utilization of auditory memory.²

Intellectually gifted children usually score higher on the auditory-vocal channel, especially on auditory-vocal association and grammatic closure, than on visual sequential memory channels. Visual memory seems to be more closely related to chronological age than mental age. In studies of the visually handicapped, visual impairment

¹Berry, Language Disorders of Children: The Bases and Diagnoses, p. 257.

²Bateman, Interpretation of the 1961 ITPA, pp. 28, 33.

milder than 20/70 does not affect ITPA performance. A definite visual channel disability is seen in legally blind subjects.¹

Much of the ITPA research has been done with those children labeled as having "learning disabilities". One of the reasons for the origination of the ITPA was the tendency to label slow-learning children as mentally retarded, even though there were variations in their abilities. There are varying definitions of the term, learning disability. A definition is important to this study because the child with a reading disability is often labeled as having a learning disability. According to Bateman a learning disabled child is:

. . . one who manifests an educationally significant discrepancy between his apparent capacity for language behavior and his actual level of language functioning. Three major categories can be delineated: (1) Dyslexia, or reading disability, is perhaps the most frequent type of all learning disabilities and language disorders. . . Those who distinguish primary dyslexia as a specific congenital syndrome find fewer cases than those whose definition is based on a simple discrepancy between apparent capacity for reading and actual level of reading, regardless of etiological or correlated factors. A conservative estimate is that five to ten percent of the school population has severe enough reading problems to require special educational concern and provisions. (Disabilities in other academic areas, such as arithmetic, do occur, but much less frequently). (2) Verbal communication disorders, or difficulties with comprehension or expression of spoken language have been labeled aphasic disorders in the past. The term is now felt to be inappropriate by many. The term 'verbal communication disorder' is used here to designate those children whose comprehension or expressive language problems involve the spoken word. (3) Visual-motor integration problems have been widely noted in conjunction with reading problems. But there are children who manifest severe spatial orientation, body image, perceptual problems, and co-ordination problems who are not dyslexic.²

¹Bateman, Interpretation of the 1961 ITPA, p. 38.

²Barbara Bateman, "Learning Disabilities--Yesterday, Today, and Tomorrow", Exceptional Children, XXXI (April, 1984), pp. 167, 168.

Kirk divides learning disorders into three groups: (a) academic disorders, (b) non-symbolic disorders, (c) and symbolic disorders. However, an academic disorder, such as reading, may include a non-symbolic disorder of perception, which is a psychological deficit. The perceptual disorder can often be traced to a neurological handicap, but for remedial purposes the academic disability and the psychological deficit become the essential factors needed in a diagnosis, if adequate remedial instruction is to be organized. Kirk has found that the most common forms of academic disabilities are reading disabilities. He describes non-symbolic disabilities as the inability to recognize "sense" impressions. A non-symbolic perceptual disability means that the sensory abilities are intact, but that there is no perception in certain modalities. (For example, a child can hear sounds, but certain ranges are muffled, others sharp and clear; a child can read a Snellen chart at 20/20, but cannot develop understanding of visual images.) Disabilities in the reception of ideas auditorially, visually, or "tactile-kinesthetically" are symbolic disabilities. In relation to the ITPA, when a child has difficulty in expressing ideas vocally or manually, the child has a symbolic or representational expressive disability. Most of these disabilities affect the complex reading process.¹

¹Kirk, The Diagnosis and Remediation of Psycholinguistic Abilities, p. 2. [Kirk uses "tactile". In this study, "tactual" will be used throughout. The first is of French derivation, the latter, Latin.]

In reviewing cases described as "learning disabilities", generalizations as to group problems are more difficult. Specific individual programs must be outlined for remediation based on ITPA profiles. The individual profile of a child with a learning disability would show a sharp decline or rise on one or more of the subtests. There is no specific pattern for these children.

The Illinois Test of Psycholinguistic Abilities and Reading Disabilities

Reading disability, or dyslexia, may be generally defined as a retardation in reading which occurs after adequate instruction, and which is not due to mental retardation or sensory defects such as blindness or deafness.¹ Differences appear in the literature concerning the classification and definition of the term "dyslexia". Some authorities consider the term to mean that the child is merely a disabled reader. Other authorities, particularly the more medically oriented, give a more complex definition of a dyslexia: (1) those in which there is a neurologic dysfunction in the absence of brain injury; and (2) those in which reading retardation is secondary to other pathology.²

Reading disability has been the subject of much research and popular discussion over the years. Reading problems are caused by poor teaching methods, lack of intelligence, sensory defects, or

¹Kass, "Psycholinguistic Disabilities of Children with Reading Problems", p. 533.

²Arthur H. Keeney and Virginia T. Kenney, Dyslexia: Diagnosis and Treatment of Reading Disorders, (Saint Louis: The C. V. Mosby Co., 1968), p. 51.

excessive absence from school. Neurologists link reading inability with brain dysfunction; clinical psychologists give the causes as "multifactored". According to Kass, a more useful approach is one in which the cause is minimized and an effort is made to discover psychological correlates of reading disability.¹

Most specialists in remedial reading relate defects in auditory acuity and auditory discrimination to reading disability. Auditory memory is probably a significant factor in reading disability. Sounds differ in intensity, pitch, timbre, duration, sequence; most children can profit from training in auditory skills. Children should develop a sensitivity to non-vocal sounds, vocal sounds, and sounds in words. Auditory discrimination, one of the most important areas tested by the ITPA, is the ability to differentiate between closely related speech sounds. There is an increase in sound discrimination ability with age--but auditory memory and auditory discrimination ability are not well developed in some children until age nine. However, this auditory ability can and should be trained.²

Visual acuity and its relation to reading is an area to consider. Some investigators have found first graders to be far-sighted. Children are visually immature at the beginning of school. At seven, vision is improved, and at ages eight and nine the visual

¹Kass, "Psycholinguistic Disabilities of Children with Reading Problems," p. 533.

²Keeney and Keeney, Dyslexia, p. 5.

fixation is greatly improved. A child who cannot adjust to difficulties of near vision may give up trying to learn. However, authorities agree that there is little relationship between visual disturbance and inability to read, unless the visual problem is severe.¹

Visual perceptual abilities are involved in the process of recognizing and discriminating stimuli, as has been previously discussed. Visual perceptual problems contribute to reading disabilities.

Visual and auditory perception can be stimulated by visual, auditory, kinesthetic, and tactual stimulation. Five chief areas of perception necessary for reading success are: (1) visual-motor, (2) figure-ground perception, (3) perception of position in space, and (4) perception of spatial relationships. If a reading readiness program covered these areas of perception there would be fewer failures in reading, according to Keeney and Keeney.²

Many successful remedial teaching techniques have utilized a multi-sensory approach. Such well-known reading researchers as Fernald, Monroe, Frostig, Horne, and Kephart stress a structural sequential approach in which later learnings are built on earlier learnings. Their goal is the integration of vision and audition with the addition of the tactual-kinesthetic approach, depending upon the severity of the problem.

¹Ibid., p. 48, 49.

²Ibid., p. 93.

The ITPA has been useful in contributing information concerning the areas needed for reading skills: auditory and visual ability and memory, perception, expression, motor-skills, grammar, syntax, auditory and visual discrimination, symbolizing and reasoning. The 1961 ITPA performances of children with reading problems have been investigated by Bateman in 1967 and 1968; Kass in 1966; and Ragland in 1966.¹ The results are consistent: children with reading problems show deficiencies at the automatic level of psycholinguistic functioning. Bateman makes some tentative generalizations concerning reading and the ITPA:

1. Children with severe and persistent reading disabilities show deficits in both auditory and visual memory. A tactual-kinesthetic method of teaching is needed.

2. The child who has poor auditory memory but good visual memory may do reasonably well in the early states of a visual (sight-word) method of reading instruction, but he will probably run into difficulty when he is expected to develop independent word attack skills and can no longer memorize every new word form (about the third grade). He will probably meet early failure in a phonics method.

¹Barbara Bateman, "The Efficacy of an Auditory and a Visual Method of First Grade Reading Instruction with Auditory and Visual Learners," Perception and Reading, ed. by Helen K. Smith (Proceedings of the 12th Annual Convention: International Reading Association, 1968), p. 93; Corrinne Kass, information corresponding to that given by Bateman; G. G. Ragland, information corresponding to that given by Bateman.

3. The child with poor visual memory and good auditory memory may have some difficulty if he is initially taught by a visual method. As soon as phonics are presented, however, his chances of success are excellent.

4. Auditory memory seems to be clearly the most important psycholinguistic ability measured by the ITPA, in terms of its role in reading. Visual memory seems less important.¹

Kass, in her study of reading disability with the ITPA, also found that the problems of these children were at the automatic level of psycholinguistic functioning. She reported that these findings suggested difficulty in the skill of reading, rather than the comprehension. Psycholinguistic clinical research concerning mental processes involved in acquiring reading skills point toward the necessity of adequate visual and auditory integration.²

When a profile of the ITPA is analyzed, one of the questions has been whether to begin work with the pupil's strengths or with his weaknesses in a particular modality. Bateman has found in her study of four first grades instructed in beginning reading that perhaps the strength or weakness of the pupil is not as important as the use of one mode of instruction--the auditory method. The children in this study were given the ITPA to determine high and low scores in

¹Bateman, Interpretation of the 1961 ITPA, p. 53.

²Kass, "Psycholinguistic Disabilities of Children with Reading Problems," pp. 533, 537.

auditory and visual skills. The study covered the first year of reading instruction in which two first grades were taught the visual (sight-word) method of reading and two grades were taught the auditory (phonic) method of reading. A study was also made of the effect of the auditory method of teaching reading upon those children who were grouped according to scores on the ITPA in visual or auditory skills. The results showed that even though the child scored higher in visual skills on the ITPA than in auditory, he learned to read with more proficiency by the auditory method of teaching reading. This bears out some of the current opinions concerning the primary importance of auditory skills in learning to read.¹

A relationship exists between the method of teaching reading (phonic, sight, etc.) and the kind of reading problem observed. A phonic method relies heavily on memory of sequence and the discrimination of letters. A visual method of teaching reading may place more emphasis on the ability to recall the identical symbol from many symbols.² The best teaching method, according to most reading authorities, would be a combination of visual and phonic approaches. Children should be taught through the avenue through which they learn best. Most children learn equally well through any receptive sense;

¹Bateman, "The Efficacy of an Auditory and a Visual Method of First Grade Reading Instruction", in Perception and Reading, ed. by Helen K. Smith, (Newark, Delaware: International Reading Association, 1967), p. 93.

²Oliver L. Hurley, "Perceptual Integration and Reading Problems", Exceptional Children, XXXV (November, 1968), 207-215.

some children, however, are primarily audile or visual, but not both.

In a society which requires reading skill for success, a tool such as the ITPA should become useful as one of the tests to pinpoint specific weaknesses in psycholinguistic skills. Ideally, in a complex area such as reading, the ITPA should be used in conjunction with other tests. Kirk discusses the complete psychometric diagnoses of children with severe reading and learning problems. A complete battery would include some of the following tests in conjunction with the ITPA:

Stanford-Binet, L-M; Peabody Picture Vocabulary Test; Vineland Social Maturity Scale; California Test of Mental Maturity; Raven Progressive Matrices; Goodenough Draw-A-Man Test; Beery Developmental Forms; Wechsler Intelligence Scales for Children; Frostig's Developmental Tests of Visual Perception; Gray's Oral Reading Test; Iota Word Recognition; Gate's Silent Reading Test; Wide-Range Achievement Test. The severity and the type of case would determine which of these tests should be given.¹

¹Kirk, The Diagnosis and Remediation of Psycholinguistic Abilities, pp. 69-250.

CHAPTER III

PROCEDURE

The revised edition of the ITPA is an individual test of psycholinguistic abilities which measures defined psycholinguistic processes. The revised edition differs specifically from the experimental edition. Both the experimental and revised editions are designed to isolate defects in (a) three processes of communication: receptive, expressive, organizing; (b) two levels of language organization: automatic and representational: and/or (c) two channels of language input and output: auditory-vocal and visual-motor. The revised ITPA assesses six psycholinguistic abilities involving meaningful (representational level) use of language and six abilities involving rote (automatic level) usage. Three subtests have been added to the revised edition of the automatic level of language organization: (1) the visual closure subtest assesses a previously untested area; (2) and the sound-blending and auditory-closure subtests give supplementary clinical information. Also, the age extension of the normative data from two years to ten years of age widens the usefulness of the revised edition.¹

¹Kirk, McCarthy, and Kirk, Examiner's Manual, Revised Edition, p. 5.

Moreover, the ITPA gives an opportunity to investigate inter-individual differences as well as intraindividual differences. According to Kirk and Paraskevopoulos, these two methods of interpretation provide answers to different questions.

The interindividual approach is relevant to the question: How does a child's performance on a subtest compare with the performance of other children the same age? The intraindividual approach is relevant to the question: How does the child's performance on an ITPA subtest compare with his performance on other subtests? Answers to each of these questions have implications for different diagnostic inferences.¹

Because reading is the subject affecting a child's success or failure in the schoolroom, and because standard achievement tests and intelligence tests involve verbal and reading skills, the psycholinguistic performance of poor readers is of considerable interest. The possibility that the revised 1968 ITPA may provide useful information regarding the nature of the language deficit in children with reading problems is proposed. The purpose of this investigation is to analyze the psycholinguistic abilities of disabled readers. A battery of varying subtests such as those in the ITPA may give a clearer picture of the child's disabilities and a plan for remediation.

Statement of the Hypotheses

The literature has shown that psycholinguistic profiles of good readers may differ from profiles of inadequate readers. Several

¹Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the ITPA, pp. 50-72.

studies using the 1961 edition of the ITPA to study reading disabilities have yielded results showing children with reading problems to be deficient at the automatic level of psycholinguistic functioning.

The specific hypotheses to be tested will be:

Hypothesis 1: There will be no variation between subtests of ITPA (Revised, 1968) obtained from a group of thirty inadequate readers.

Hypothesis 2: There will be no difference between a group of thirty inadequate readers and the theoretical normal expectancy on any of the twelve subtests of the ITPA (Revised, 1968).

Hypothesis 3: There will be no difference between a group of thirty inadequate readers and the theoretical normal expectancy on all subtests at the representational level, taken as a whole.

Hypothesis 4: There will be no difference between a group of thirty inadequate readers and the theoretical normal expectancy on all subtests at the automatic level, taken as a whole.

Selection of the Subjects

Thirty subjects, selected from students at Hunter Elementary School in Greensboro, North Carolina because of inadequate reading, were used in this study. These children were eight to ten years of age. This chronological range was chosen because the maximum chronological age score on the ITPA is ten years of age, and a child between the ages of eight and ten years would have received two, three, or more years of reading instruction in the public schools. The

individual permanent records of each child were used for verification of birth date and grade level. There was no discussion or research into the methods of teaching reading or of the individual capabilities of each child. Children who were described in school records as being emotionally disturbed, mentally retarded, physically handicapped, or as having speech or hearing disorders were not chosen for this study.

Hunter Elementary School was considered by school personnel to be average in socio-economic rank when compared with the predominantly upper-income and lower-income schools in the city. Located in a semi-industrial section of the city, the school enrolls a predominantly white middle-class population.

Scores on selected subtests of the Stanford Achievement Test were used to determine reading level. The Stanford Achievement Test is a standardized, comprehensive group of subtests developed to measure skills and knowledge of the most important areas of the elementary curriculum. The tests are dependable measures, comparable from subject to subject and grade to grade for use in improvement of instruction, pupil guidance, and progress evaluation. The normative standardized data was drawn from 264 school systems from fifty states. Over 850,000 pupils were tested in 1963. Public schools (integrated, segregated white, segregated Negro) private nonsectarian, and private sectarian schools were included in the sample.¹

¹Truman L. Kelley, Richard Madden, Eric F. Gardner, and Herbert Redman, Stanford Achievement Test. Direction for Administering, Primary Battery II. (Harcourt, Brace, and World, Inc.: New York, 1965), pp. 1, 31, 32.

Scores on the selected subtests of the Stanford Achievement Test were used to identify readers for this study because of the wide standardization of this achievement test, its reliability, and because the test was the preferred reading achievement test used by the Model School for Developmental Reading Instruction, a program financed by the Title III grant of the Elementary and Secondary Education Act of 1965. This model reading program, located in Greensboro, North Carolina, provided in-service provision for training teachers in diagnosis and in the application of the most current techniques in teaching reading.¹

Of the eight subtests in the Primary Battery of the Stanford Achievement Test (middle of grade two to end of grade three), four subtests were thought to be most closely related to reading disability: word meaning, paragraph meaning, spelling, and word study skills.²

The word meaning subtest consisted of thirty-six multiple choice items graduated in difficulty, from which one or more words was omitted. The spelling subtest measured by means of a thirty-item dictation-type spelling test. The word-study skills subtest included multiple choice items: beginning and ending sounds and visual phonics.³

¹Continuation Grant Application, Title III, Model School for Developmental Reading Instruction, (Greensboro Public Schools and Piedmont Association for School Studies and Services, 1969), pp. 1-2.

²Edward Fry, "Programed Instruction and Automation in Beginning Reading", A Decade of Innovations: Approaches to Beginning Reading, ed. by Elaine Vilscek, (Newark, Delaware: International Reading Association, 1968), p. 212.

³Truman L. Kelly, et. al, Stanford Achievement Test, Direction for Administering, pp. 4-5.

Scores of these four subtests were averaged according to grade level. Subjects whose mean score was 2.3 (second grade, third month) or below on the four subtests were selected. At the time this test was administered these children were in the third grade, second month. The mean score, 2.3, indicated that the child scored nine months below grade level on these four subtests for his age. (See Appendix, Table 4, p. 75)

Test Administration

The Illinois Test of Psycholinguistic Abilities (Revised, 1968) was administered according to standard procedures¹ to a sample of thirty inadequate readers selected as described above. The children were tested at Hunter Elementary School within a six weeks period. The testing was done in a small room furnished with a table and two chairs. Each child was tested individually. Only the examiner and the subject were present during the test. Each child was engaged in informal conversation prior to the beginning of the test in order to familiarize him with the surroundings and with the examiner. No explanation of the purpose of the test was offered; the subjects were told that they would play games, answer questions, and look at pictures.

Following the completion of each test, the results were tabulated and scored according to the procedure described in the

¹Kirk, McCarthy, and Kirk, Examiner's Manual, Revised Edition, pp. 15-20.

Examiner's Manual. The raw scores for each subtest were recorded on a summary sheet in each subject's test booklet. From the raw scores on each of the subtests, an age score was derived, using the table in the Examiner's Manual,¹ and recorded on the summary sheet. In addition, a scaled score for each subtest was derived from the table in the Examiner's Manual. Scaled scores take into account the mean performance of the normative groups and the variability of scores about the mean. Scaled scores are valuable because various subtests are comparable within and across age levels. They are generally the most appropriate scores in making evaluations of the individual's standing relative to the normative group or to another child. Scaled scores are linear transformations of raw scores. At each age and for each of the twelve subtests, the mean performance of the normative group is equal to a score of thirty-six with a standard deviation of six. A psycholinguistic age (PLA) was derived from the composite raw scores of the ten basic subtests. The PLA is a global score, similar to a mental age, and an overall index of psycholinguistic abilities and disabilities.²

Using the procedure outlined above, raw scores, age scores, and scaled scores were recorded for each of the twelve subtests for each subject (See Appendix, Table 5, p. 76). The scaled scores were used for the analysis of results, which is presented in the following chapter.

¹Ibid., p. 93.

²Ibid., p. 94.

CHAPTER IV

RESULTS

Data on thirty inadequate readers, aged eight to ten years, was obtained in order to investigate their psycholinguistic abilities. The ITPA was administered to each subject according to standard procedures.¹ The tests were scored, yielding a raw score, age score, and scaled score for each subject on each of the twelve subtests of the ITPA. The scaled scores were used in the analyses which are presented in this chapter.

Analysis of the scaled scores of the thirty subjects on the twelve subtests indicate that there were significant findings. In order to determine the variation, if any, between subtests of the thirty subjects, the data were subjected to an analysis of variance, using a subjects by treatments repeated measurement design. The results of this statistical analysis are presented in Table 1.

The results of the analysis of variance indicate that the mean scaled scores of thirty inadequate readers on the twelve subtests of the ITPA do vary significantly beyond the .01 level of confidence. Therefore, the hypothesis that there would be no variation between subtests of the ITPA obtained from a group of thirty inadequate readers was rejected.

¹Kirk, McCarthy, and Kirk, Examiner's Manual, Revised Edition, pp. 5-13.

TABLE 1

Analysis of Variance Comparing the Mean Scaled Scores of Thirty Inadequate Readers on the Twelve Subtests of the Illinois Test of Psycholinguistic Abilities

Source	df	ss	ms	f
Subjects	29	2805	--	--
Treatments	11	2171	197.364	5.780*
Error	319	10,894	34.150	

*Significant beyond .01 level

One of the most significant findings in this study is that the thirty inadequate readers tested with the ITPA scored lower on total variance scores than did the normative group. Previous studies using the ITPA with slow readers have produced a similar result: normal children who have reading problems do not perform as well on the ITPA as normal children who do not have reading problems. This supports the relationship between language, psycholinguistic abilities and reading skills.

In order to determine the significance of the difference between the mean scaled score of the thirty subjects considered on each of the twelve subtests, and the theoretical normal mean scaled score for each subtest ($M=36$, $SD=6$), t -ratios were computed. Multiplying the value of t ($df=319$), which is 1.96 at the .05 level of confidence, times the standard error of the difference between

means, which was 1.509, a critical difference of 2.958 was obtained. Using the same method, the critical difference at the .01 level of confidence was found to be 3.693. The obtained differences between means are presented in Table 2.

Inspection of the data reveals significant differences between the normative mean and the experimental means on five of twelve subtests of the ITPA: auditory reception, auditory association, visual association, manual expression, and visual sequential memory. The greatest difference occurred on the visual sequential memory subtest, a task requiring the subject to remember and reconstruct a series of chips, gradually increasing in length, on which are depicted black outline figures of low symbolic meaningfulness. The smallest difference occurred on the manual expression subtest, a task requiring the subject to demonstrate by gesture alone the uses of various items. In view of significant differences found, the second hypothesis was rejected.

Previous studies using the ITPA to evaluate children with reading problems have not shown these areas to be significantly low. Bateman, Kirk, Kass and Ragland¹ have reported that inadequate readers did not perform well on the visual sequential memory subtest and the auditory sequential memory subtest. Bateman reported similar results,

¹Bateman, Interpretation of the 1961 ITPA, pp. 46-53; Samuel A Kirk, information corresponding to that given for Bateman; Corrinne E. Kass, information corresponding to that given for Bateman; G. G. Ragland, information corresponding to that given for Bateman.

TABLE 2

Summary of t Testing the Differences Between the Theoretical Normal Expectancy and Thirty Inadequate Readers on Twelve Subtests of the Illinois Test of Psycholinguistic Abilities

Subtest	Normal Mean	Experimental Means	Difference Between Means
Auditory Reception	36	30.267	5.733**
Auditory Association	36	31.000	5.000**
Verbal Expression	36	34.800	1.200
Visual Reception	36	33.533	2.467
Visual Association	36	32.000	4.000**
Manual Expression	36	32.833	3.197*
Auditory Memory	36	34.133	1.867
Grammatical Closure	36	34.733	1.267
Auditory Closure	36	36.533	-.533
Sound Blending	36	33.867	2.133
Visual Memory	36	26.967	10.033**
Visual Closure	36	34.567	1.433

Critical difference .05 = 2.958. Critical difference .01 = 3.693.

*Significant at .05 level

**Significant at .01 level

and added verbal expression to the list of particularly troublesome areas. Bateman reported that inadequate readers frequently, but not necessarily, do well on the visual expression subtest and the motor (manual) expression subtest. However, the subjects in this study fell significantly below the normative level on the manual expression subtest.

Of further interest was the comparison of inadequate readers and the theoretical normal group on the two levels, representational and automatic, considering the subtests within those levels as a whole. The sum of the scores of all subtests on all tasks at the representational level was divided by the number of subjects (30) times the number of subtests (6), yielding a grand mean score for the representational level. A grand mean score for the automatic level was computed in a similar manner. A t-ratio was used to compare the means of each level with the theoretical normal expectancy ($M=36$, $SD=6$). The results of this analysis are presented in Table 3.

TABLE 3

Summary of t Testing the Differences Between the Theoretical Normal Expectancy and Thirty Inadequate Readers on Two Levels of the Illinois Test of Psycholinguistic Abilities:
Representational and Automatic

Level	Normal Mean	Experimental Means	Difference Between Means
Representational	36	32.739	3.261*
Automatic	36	33.466	2.534

Critical difference .05 = 2.958. Critical difference .01 = 3.693

*Significant at .05 level

It is apparent from the data presented in Table 3 that the mean scaled score of the poor readers on representational tasks was significantly lower than the theoretical normal expectancy, while at the automatic level the poor readers do not significantly differ from the normals. Thus, the hypothesis that there would be no difference between a group of thirty inadequate readers and the theoretical normal expectancy on all subtests at the representational level, taken as a whole, is rejected. The hypothesis that the inadequate readers would not differ from the normative data on subtests at the automatic level, taken as a whole, is not rejected.

Previous research on the 1961 ITPA reported by Bateman, Kirk, and Paraskevopoulos have shown inadequate readers to score lower at the automatic level than at the representational level. Bateman reports in her review of research material on the 1961 ITPA that children with reading problems show deficiencies at the automatic level of psycholinguistic functioning.¹ Kirk reports: "Reading disability cases (dyslexia) tend to have superior abilities at the conceptual or representational level as compared to abilities at the automatic level. . ." ² The findings in this study are contradictory to these results.

The results of this study indicate that inadequate readers as determined by the Stanford Achievement Test scored significantly

¹Bateman, The Interpretation of the ITPA, p. 46.

²Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the Revised ITPA, p. 191.

below the theoretical normal expectancy on the following subtests: visual sequential memory, auditory reception, auditory association, visual association, and manual expression. In addition, the mean scores at the representational level as compared to the automatic level are significantly lower than normal. These findings will be discussed in the following chapter.

CHAPTER V

DISCUSSION

The purpose of this study was to investigate the psycholinguistic abilities of inadequate readers. It was hoped that this information would allow the investigator to make some inferences regarding the language skills necessary to reading as well as to provide some insight into the remediation of these language deficits. The following areas will be discussed: (1) the automatic and representational levels of the ITPA; (2) the five subtests distinguishing inadequate readers from the theoretical normal expectancy; and (3) subjective judgments regarding the performance of inadequate readers on the supplementary subtests of the ITPA.

The Automatic and Representational Levels of the ITPA

A definition of the automatic and representational levels is important to this discussion. Kirk and Paraskevopoulos explain these two divisions in the ITPA:

The levels of organization refer to the degree to which habits of communication have been developed within the individual. Two levels are postulated in the clinical model of the ITPA: (a) the representational level, which requires the mediating process of utilizing symbols which carry the meaning of an object; (b) the automatic level in which the individual's habits of functioning are less voluntary but highly organized and integrated. The automatic chain of responses of the latter level is involved in such activities as visual and auditory closure, speed of

perception, ability to reproduce a sequence seen or heard, rote learning, synthesizing isolated sounds into a word, and utilizing redundancies of experience.¹

The comparison of groups of studies and how these groups performed on the two levels, automatic and representational, on the experimental edition of the ITPA has received considerable attention in previous research. The assumption has been made by Bateman that the 1968 ITPA would follow the same general pattern of scores for groups of children at the automatic and representational levels.² In previous studies reported by Bateman and Kirk with the experimental edition of the ITPA and reading disabilities, the groups of subjects scored lower at the automatic level than at the representational level.³ This study does not support that view.

There are three possible explanations why this difference may have occurred in this study. (1) The first is that as a result of revisions in the 1968 version of the ITPA the test may be more balanced. The two supplementary subtests were included in all score averages of this study, making a balance of six subtests at the representational level and six subtests at the automatic level. (In the experimental edition there were six subtests at the representational level and three at the automatic level.) This would appear to give more tasks

¹Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the Revised ITPA, p. 14.

²Bateman, Interpretation of the 1961 Illinois Test of Psycholinguistic Abilities, p. 6.

³Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the Revised ITPA, p. 191; Barbara D. Bateman, information corresponding to that given for Paraskevopoulos and Kirk.

at the automatic level, thereby giving a more even distribution to the 1968 revised edition of the ITPA. (2) The second explanation is that the children tested at Hunter School, although from a middle-class socio-economic area, may have represented the lowest strata of this semi-industrial area. The area surrounding this school draws from a middle-income suburban housing development as well as some lower-income industrial housing. In personally evaluating the children as to grammar, verbal expression, and personal appearance, a majority of the thirty subjects showed characteristics of children from disadvantaged, lower-income homes. From previous studies with the ITPA it has been found that lower-class and mentally retarded subjects score lower on auditory reception and auditory association, two areas on which the subjects in this study scored lower. Auditory association scores correlate higher with the Stanford-Binet mental age than with any other subtests in reliability studies with the revised ITPA.¹

(3) Another supposition is that too much emphasis has been placed upon the two levels, automatic and representational, in previous research. According to Kirk and Paraskevopoulos . . . "tentative observations suggest the need for reconsideration of the notions regarding intralevel and intrachannel relationships as well as placement of some subtests in the model."² For example, placing a skill such as grammatic ability

¹Ibid., p. 35.

²Ibid., p. 189.

in the automatic category is questionable. Concerning the automatic level of the ITPA Mildred Berry writes:

We do not regard the automatic-sequential test of the ITPA as automatic. The auditory vocal subtest [referred to as grammatic closure in the revised edition] at the automatic level is an example. This subtest appraises grammar and syntax. A child in the stages of learning the rules of grammar does not operate codes of language automatically If the example of adding 's' to apple is automatic, why is not the example from the auditory vocal association [representational level] automatic: 'I sit on a chair, I sleep on a bed'.¹

Bateman justifies the grammatic subtest at the automatic level by the explanation that we cannot tell why we add a /t/ to the past tense of "stop" and "wreck", even though these words are spelled "stopped" and "wrecked." She believes the usage is acquired automatically, and by habit. However, Bateman writes that if we find that this ability depends upon learning a "particular language", then the grammatical ability subtest should be moved from the automatic level to the representational level.² Continued research with the ITPA and psycholinguistic grammatical learning will determine whether these are valid questions.

Subtests Distinguishing Inadequate Readers

The thirty inadequate readers in this study scored significantly below the normative scores on five subtests of the ITPA: visual sequential memory, auditory reception, auditory association, visual

¹Berry, Language Disorders of Children, p. 256.

²Bateman, Interpretation of the 1961 ITPA, p. 11.

association, and manual expression. Of these subtests, the visual sequential memory is thought to be the most directly related to the skill of reading.

Visual Sequential Memory

Visual sequential memory, the only significantly different subtest at the automatic level, was the skill on which these children scored the lowest. This subtest purported to examine a child's ability to remember and arrange abstract symbols horizontally. The examiner found that the subjects had difficulty in understanding and carrying out this exercise, even after the allotted trials. The subjects often seemed to guess. Possible explanations for guessing on this subtest are that the subjects did not understand the task or could not remember the sequence quickly. Perhaps this is the way these children would attack an unknown word in reading. The subjects showed insecurity on this subtest by looking at the examiner for cues, and by slowness in performing the task.

This skill seemed questionable as an automatic skill. Intellectual memory seemed important, as well as concentration upon and quick mastery of unfamiliar geometric designs. Some mathematical symbolization may be needed in this exercise, rather than the intended analogy to word and letter sequences. When these abstract geometric figures were arranged they did not resemble words or letters.

Since this subtest was designed to test "the ability to repeat

a sequence of nonmeaningful stimuli,"¹ another supposition might be that these children had been taught to read primarily by a visual (memorization) method of reading, and not by an analysis of sounds. The alphabet is a group of "nonmeaningful stimuli" to a beginning reader. Perhaps the subject's inability to remember an abstract symbol may coincide with their inability to remember groups of letters or words when visualized on a page, from one reading lesson to the next. A severe weakness in visual sequential memory might suggest that the visual memory avenue should not be used in teaching this child to read. If the child is unable to remember abstract symbols, perhaps a strong bombardment of auditory drills for decoding the visual configurations is needed. This would involve giving a "name" or "sound" to the configurations or groups of configurations. This practice of naming the configurations leads to the discussion of another discovery concerning this subtest.

Some of the children who performed well on this subtest were questioned as to how they accomplished the task. They reported that they attached names such as "spider" and "airplane" to the abstract symbol that resembled a spider or an airplane. In this way, the subject remembers the sequence of symbols by naming them, silently. This process would seem to be similar to reauditorization in reading and similar to a phonic decoding process mentioned above. It suggests

¹Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the Revised ITPA, p. 15.

that when the visual sequencing skill was accomplished in this manner, the visual sequencing subtest measures auditory sequential memory, not visual sequential memory. Research is needed to determine the efficacy of using abstract symbols on this test, as well as to determine processes involved in visual memory.

Kirk has made specific suggestions for remedial techniques for children who do not perform well on the visual sequential memory subtest of the ITPA. His experience is based on studies with the experimental edition of the ITPA. His approach to remediation of these children would involve skills such as (1) arranging chips, blocks, words or numbers in the same order as the teacher's; (2) imitation of finger plays, puppet plays, and finger games; (3) folding newspaper from memory; (4) bead stringing; (5) recalling objects, pictures, and people; (6) drawing in missing parts of pictures; (7) arranging cards in order; (8) treasure hunts; (9) spelling by the kinesthetic method (tracing and writing from memory); (10) writing words seen on flash cards from memory; (11) reproducing patterns with blocks according to shape and color; (12) reproducing discs with arithmetic symbols; (13) feeling raised geometric shapes; and (14) making pictures by following dots.¹

Auditory Reception

The second lowest subtest from the normal expectancy was auditory reception. This subtest, as well as the remaining three

¹Kirk, The Diagnosis and Remediation of Psycholinguistic Abilities, pp. 69-250.

subtests to be discussed, is at the representational level. Questions to test auditory receptive skills such as "Do dogs fly?" were asked. A nod, or a "yes" or "no" was sufficient as an answer. The non-verbal response was particularly appropriate in view of the subjects' generally shy approach to the testing situation. This test was constructed in order to reduce variation due to syntactical structure. Conceptual ability and meaningful symbolization were required in this test.

The relationship of reading to the auditory reception subtest lies in the areas of comprehension, vocabulary strength, and reasoning ability. These subjects seemed to have difficulty in these areas. On the Stanford Achievement Test, twenty-four out of thirty of these third grade subjects scored at the first grade level of reading ability on the word-meaning subtest. (See Table 4) Eighteen out of thirty subjects scored at the first grade level on the paragraph meaning subtest. (See Table 4) These two areas of the Stanford Achievement Test correspond with the areas tested by the ITPA at the representational level. The results of scores on the Stanford Achievement Test are similar to the findings on the ITPA with these subjects.

Kirk's suggestions for remediation of the deficit in auditory reception utilized concepts such as (1) defining opposites; (2) matching pictures of similar items; (3) describing differences; (4) interpreting magazine pictures; (5) following detailed directions; (6) answering questions about material read aloud to the subject; and, (7) filling

in meaningful words to complete a story.¹

Auditory Association

The third subtest in order of significant difference from the normative scores was auditory association. In establishing the normative data for the revised edition of the ITPA, it was reported that this subtest showed the highest test-retest reliability among the twelve subtests. This subtest also has the highest correlation with the Stanford-Binet mental age than any other subtest,² as has been previously mentioned. This test was made up of verbal analogies (e.g. Smoke goes up; rain comes down). The test was easily administered and easily understood by the subjects. Auditory association is related to reading in much the same way as is auditory reception. This relationship includes comprehension, understanding of differences, and vocabulary ability. According to Kirk, a deficit in auditory association might be remedied by (1) association of auditory cues (letters and words) with visual cues; (2) discussing relationships among concepts such as letters, words, sentences, and paragraphs; (3) supplying missing words in sentences; (4) and all exercises similar to those for auditory reception.³

¹Ibid., p. 69-250.

²Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the Revised ITPA, p. 35.

³Kirk, The Diagnosis and Remediation of Psycholinguistic Abilities, pp. 69-250.

While some of Kirk's suggestions would be useful in remediation of certain areas of auditory association, they seem to involve automatic drill in the word attack areas of reading. This subtest does not involve testing of the subject's ability to associate letters or word-units with anything else. The fact that Kirk has utilized pragmatic drill for conceptual, associational skills points out the interrelated and overlapping areas in the ITPA, and the difficulty in isolating complex skills involving encoding and decoding.

Visual Association

The fourth subtest which showed significant differences from the normative population was visual association. This test was comparable to the auditory association subtest in testing complex conceptual abilities. Four pictures on one page are shown to the subject and he must choose one picture which relates to the stimulus picture. This subtest required reasoning and symbolization, but involved no language.

This subtest, visual association, correlates highly in the reliability data with auditory association; auditory association correlates highly with auditory reception.¹ These three subtests (auditory association, auditory reception, and visual association) call for complex thinking processes. These three subtests as constructed for the experimental and revised editions of the ITPA could

¹Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the Revised ITPA, p. 37.

unquestionably be called conceptual, or representational level subtests. As has been previously suggested, the visual sequential memory subtest may call for representational level skills, due to the involved processes of remembering sequences. Kirk indirectly supports this view in that his remedial suggestions for this fourth subtest, visual association, involve the same remedial skills given for the three previously discussed subtests.

Manual Expression

The manual expression subtest was the fifth subtest which was significantly different from, although closer to, the normative scores. The subject was required to look at a picture and describe it by gesture, using no language. Because of the previously mentioned characteristics of these subjects, (shyness, lack of spontaneity, and lack of expressive ability) this score seemed to follow the general pattern of low psycholinguistic profiles for this particular group of subjects.

One particular skill should be eliminated from this subtest. This involved the pantomime of a person putting a cigarette to his mouth, lighting it, blowing out the smoke, and flicking the ashes. With only one or two exceptions, this group of children showed embarrassment and complete resistance to "acting out" this task. On one occasion the examiner was given a lecture concerning the harms of tobacco, but no pantomime. Whether this was due to recent anti-smoking advertisements, or whether this represented narrowness in religious

teachings common in the South is not known. The task seemed inappropriate for children.

According to Kirk, the manual or motor expression subtest suggests different avenues of remediation, depending upon the age of the child and the type of home background. Some of these exercises were (1) pantomime; (2) use of gesture to describe something; (3) finger-painting; (4) use of a balancing board, and similar balancing exercises; (5) "Simon says" and similar games; (6) free movement to music; and (7) typewriting to recorded materials or music.¹

Kirk has been criticized for his remedial techniques for specific perceptual skills, based on weaknesses disclosed by the ITPA, rather than primary concentration on remedial reading. Harris wrote in 1969 that there was a need for a revised version of the ITPA which would be more statistically accurate and would provide more accurate diagnostic analysis of perceptual and linguistic skills. Harris believes that information is needed to determine whether remedial programs based on a test such as the ITPA will be valuable in the remediation of such complex psycholinguistic skills as reading.²

In general, remedial techniques based on the five below-average subtests for the majority of individuals tested in this

¹Kirk, The Diagnosis and Remediation of Psycholinguistic Abilities, pp. 69-250.

²Albert J. Harris, "What About Special Theories of Teaching Remedial Reading?", Current Issues in Reading, Edited by Nila Blanton Smith, (Newark, Delaware: International Reading Association, 1969), p. 399.

study could involve varied procedures. Ideally, complex conceptual and symbolization (representational) learning would take place in a total learning environment within both the home and school situation. Individual instruction is impossible, outside the classroom, for hundreds of inadequate readers. Most of the areas of psycholinguistic ability would not develop as readily in a traditional, lecture-type, "teacher-oriented" classroom as in a "child-centered" atmosphere in which the child could express himself without fear, and direct and take responsibility for some of his own activities. Whether the child is a normal learner, or a disadvantaged or slow learner, all of the linguistic skills tested by the ITPA which affect reading success could be remedied by the following activities: by creative dramatics, role-playing, poetry memorization, and choral reading; by allowing children to move freely about the classroom, knowing the rules and limitations; by reading for favorite subject matter, not because it is "reading time;" by small tables utilizing grouping and learning centers where the child could work with art materials, word games, drill materials, or manual skills; by emphasizing individual physical and motor expression, rather than games in which many children stand idle waiting their turn; by the proper use of teaching machines and workbooks whereby the child could have individualized, structured, yet self-directed learning; and most important, by language enrichment involving word analysis (phonic, phonetic or linguistic), verbal expression of thoughts, and creative writing of the child's own language, rather than relying exclusively upon textbook language. All

of these activities may need to be supplemented by additional drill in those areas described as automatic: work attack skills, imitation, and memorization. These activities should be structured and highly organized, yet encourage freedom. These general ideas of classroom management have been used with the educable and trainable mentally retarded, and in kindergarten settings for years. The realization that slow as well as normal children of all ages profit in communication and language skills from this kind of atmosphere is slowly becoming accepted in the United States and abroad.

Subjective Judgments Regarding the Supplementary Subtests

The purpose of the two supplementary subtests, auditory closure and sound-blending, in the revised edition of the ITPA was to evaluate a child's ability in phonics and word-attack skills. The children in this study did not differ significantly from the normal expectancy on these subtests. However, some subjective observations regarding these skills may be helpful in understanding language skills involved in reading.

The purpose of the auditory closure subtest was to assess an automatic function which "occurs in everyday life in situations such as understanding foreign accents, speech defects, or poor telephone connections."¹ Because these subjects showed some signs of regional dialect and grammatical errors, perhaps this test was no problem to

¹Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the ITPA, p. 21.

them. In their everyday experiences they would understand speech similar to theirs (e.g. that of their peers and parents), and at the time try to understand television speech, and other so-called "educated" speech. The subjects in this study scored slightly above the normative level, although no significant difference was found. This was the only subtest on the ITPA on which the subjects scored above the normative population. This subtest was conducive to guessing and very much like a game. The examiner would say only parts of the word. The child could quickly guess what was said. Even if the child said a word other than the one printed on the score sheet, he was given credit if the word closely resembled another meaningful word which had the same sounds.

The sound-blending subtest involved synthesizing separate parts of a word into a whole word. Linguists prefer that a word be sounded in units, syllables or small words such as: "pat, map" rather than "p-~~at~~-t" or "mu-~~ap~~ -p." Linguists feel that words are distorted when repeated auditorially by separate letters.¹ There is a definite skill to administering this supplementary subtest so that a phoneme sound, /p/, is heard as a brief, plosive sound, and not as "puh." The words on this subtest are broken into definite single sound units, rather than syllables. The subjects scored lower than the normative

¹Sarah M. Irvin, "Applying Structural Linguistics in Beginning Reading, Practical Teaching Suggestions," Edited by Elaine C. Vilacek in A Decade of Innovations: Approaches to Beginning Reading, (Newark, Delaware: International Reading Association, 1967), p. 200.

scores on the sound blending subtest, but the difference was not significant. However, from subjective evaluation recorded at the end of each ITPA profile and from the investigator's experience in teaching reading, notation was made that the majority of subjects lacked skill in sound blending ability. This evaluation was made from observations of the child's performance on the sound blending subtest, not from subtest numerical scores or from auditory closure scores. The subjects did, in fact, score lower than the normative population on the sound blending subtest, but in a group study, these scores were not significant. Perhaps evaluation of an individual profile of a child would lead to remediation in word attack skills based on the sound blending subtest; in a group study, however, these scores would not appear to be as important as other, lower scores. The numerical scores on these two brief tests might be misleading in determining a child's ability or inability in word attack skills. Paraskevopoulos and Kirk were aware of this weakness at the automatic level when they wrote:

Addition of tests at the automatic level to include visual and auditory discrimination and vocal and manual mimicry or imitation would have increased the test battery by another four tests. There are other tests available to clinicians which are used when necessary. For example, a severe deficit in auditory reception should lead the clinician to a test of auditory discrimination.¹

This quotation further complicates analyses of profiles of the ITPA for remediation. These authorities on the ITPA recommend auditory discrimination tests based on poor performance on the auditory reception

¹Paraskevopoulos and Kirk, The Development and Psychometric Characteristics of the Revised Illinois Test of Psycholinguistic Abilities, p. 16.

subtest at the representational level; actually, the primary tests for finding this inability, auditory closure and sound blending, supposedly fall at the automatic level. Two judgments can be made from this:

- (1) the interpretation of an ITPA profile must be made by a person completely familiar with all of the complex areas of the test, and
- (2) if the subject scores lower than the norm on any subtest involved with auditory receptive or auditory expressive skills, the examiner may suspect a need for drill in auditory discrimination skills. Further research concerning these subtests will determine whether they are adequate measures for assessing auditory phonic skills.

As mentioned often in this study, in any reading problem the child should be evaluated as to word attack skills. The emphasis upon sounds and units of sounds is an ancient method, but was lost during the "progressive education" period. Linguistics is bringing a more refined approach to sound-analysis of words and its proper place in the language.¹

Ultimate progress in reading is dependent on these factors: noticing separate sounds in spoken words; seeing differences in printed letters and words; seeing relationships between speech and words; turning sound symbols into letter symbols and letter symbols into sound symbols. The individual who depends totally upon configuration and memorization skills will find reading increasingly difficult because his identification problems increase as new words are introduced. Independence in reading needs phonetic and structural analysis skills. Phonics training seems to equip the pupil with one general coding system that fosters development in independence. . .

¹Dechant, Linguistics, Phonics, and the Teaching of Reading, p. 93.

The use of phonics alone does not make a reading program. No amount of phonic training will lead the child to understand the meaning of a written word if the child has never associated an experience with its oral equivalent. . . isolated words should always be brought back into the larger patterns and structures that function linguistically and which carry meaning.¹

The ideal instruction in reading will encourage utilization of all of the senses. The best approach for one child will not be the best approach for another. The best method for one teacher will not suit the personality of another teacher. From tools such as the ITPA we are learning how to deal with differences--the visual, the auditory (phonic, linguistic, or phonetic), the tactual-kinesthetic, and the conceptual.

¹Ibid., pp. 16-18.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The psycholinguistic abilities of children with reading problems has been of interest to persons in language related fields. Previous studies have shown children with reading problems to score lower than children without reading problems on the Illinois Test of Psycholinguistic Abilities, particularly on the automatic level of the test.

The recent development of the experimental ITPA in 1961 and the revised edition in 1968 has contributed significantly to the testing of children with language-related problems. Two familiar psychometric tests, the Stanford-Binet Intelligence Scale and the Wechsler Intelligence Scale for Children, are important tests; however, the authors of the ITPA realized a need for a psychometric test for children who had little or no language ability, or for children who were handicapped in language ability. The ITPA is filling this need, and is becoming an accepted measure for psychologists and clinicians involved in the testing of children; further research is needed to determine whether the test is, in fact, reliable in pinpointing specific areas requiring remedial work.

The purpose of this study was to investigate the psycholinguistic abilities of a group of thirty inadequate readers, using

the revised edition of the Illinois Test of Psycholinguistic Abilities. It was hypothesized that there would be no difference between a group of thirty inadequate readers and the theoretical normal expectancy on any of the twelve subtests. It was also hypothesized that there would be no difference between the performance of the subjects on tasks at the representational level as compared to their performance on tasks at the automatic level.

Thirty boys and girls, aged eight to ten years, were selected from the public schools of Greensboro, North Carolina. These subjects were chosen on the basis of reading-related scores on the Stanford Achievement Test. The Illinois Test of Psycholinguistic Abilities (Revised, 1968) was administered to the selected children according to standardized procedure.

The resulting data were tabulated and analyzed statistically, using a subjects by treatments repeated measurement design. The significance level was set at the .05 level of confidence. The analysis yielded the following results:

1. Inadequate readers scored significantly lower on five subtests of the ITPA: auditory reception, auditory association, visual association, manual expression, and visual sequential memory.

2. Contrary to previous studies, the inadequate readers scored significantly lower than the theoretical normal expectancy on representational level tasks, while at the automatic level no significant differences were found.

Possible interpretations of the findings were discussed and suggestions for remedial procedures were made.

BIBLIOGRAPHY

Books

- Bateman, Barbara D. The ITPA in Current Research: Summaries of Studies. Urbana, Illinois: University of Illinois Press, 1965.
- Bateman, Barbara D. Interpretation of the 1961 Illinois Test of Psycholinguistic Abilities. Seattle: Special Child Publications, 1968.
- Beery, Althea. "Implementing Major Instructional Factors," Reading and the Elementary School Curriculum. Edited by David L. Shepherd. Newark, Delaware: International Reading Association, 1969.
- Berry, Mildred Freburg. Language Disorders of Children: The Bases and Diagnoses. New York: Appleton-Century-Crofts, 1969.
- Carter, Homer L. J. and McGinnis, Dorothy J. Diagnosis and Treatment of the Disabled Reader. London: The MacMillan Co., 1970.
- Cronbach, Lee J. Essentials of Psychological Testing. New York: Harper and Row, 1960.
- Dechant, Emerald. Linguistics, Phonics, and the Teaching of Reading. Springfield, Ill.: Charles C. Thomas, 1969.
- Dow, Clyde W. An Introduction to Graduate Study in Speech and Theatre. East Lansing, Michigan: Michigan State University Press, 1961.
- Durr, William K., Ed. Reading Difficulties: Diagnosis, Correction and Remediation. Newark, Delaware: International Reading Association, 1970.
- Eisenson, Jon; Auer, J. Jeffery; and Irwin, John V. The Psychology of Communication. New York: Appleton-Century-Crofts, 1963.
- _____. Stuttering, A Symposium. New York: Harper and Row, 1958.
- Fries, Charles C. Linguistics and Reading. New York: Holt, Rinehart and Winston, Inc., 1962.

- Goodman, Kenneth S., Ed. The Psycholinguistic Nature of the Reading Process. Detroit: Wayne State University Press, 1968.
- Harris, Theodore L.; Creekmore, Mildren; and Greenman, Margaret. Phonetic Keys to Reading, A Basic Reading Series. Oklahoma City, Atlanta, Indianapolis: The Economy Company, 1967.
- Hegge, Thorleif G.; Kirk, Samuel A.; and Kirk, Winifred. Remedial Reading Drills. Ann Arbor, Mich.: George Wahr Publishing Co., 1969.
- Hellmuth, Jerome, ed. Educational Theapy. Volume One. Seattle: Special Child Publications, 1966.
- Johnson, Doris J., and Myklebust, Helmer R. "Dyslexia in Childhood." Learning Disorders. Volume One. Edited by Jerome Hellmuth. Seattle: Special Child Publications, 1965.
- _____. Learning Disabilities, Educational Principles and Practices. New York and London: Grune and Stratton, 1967.
- Keeney, Arthur H., and Keeney, Virginia T. Dyslexia: Diagnosis and Treatment of Reading Disorders. Saint Louis: The C. V. Mosby Co., 1968.
- Kelley, Truman L., et al. Stanford Achievement Test. Directions for Administering. Primary II Battery. New York: Harcourt, Brace, and World, Inc., 1965.
- Kirk, Samuel A. The Diagnosis and Remediation of Psycholinguistic Abilities. Institute for Research on Exceptional Children: University of Illinois Press, 1966.
- _____. "Amelioration of Mental Disabilities Through Psychodiagnosis and Remedial Procedure." Mental Retardation. Edited by George A. Jervis. Springfield, Illinois: Charles C. Thomas, 1967.
- _____, McCarthy, James J.; and Kirk, Winifred D. Examiner's Manual. Illinois Test of Psycholinguistic Abilities. Revised Edition. Urbana, Illinois: University of Illinois Press, 1968.
- Lee, Irving J. Language Habits in Human Affairs. New York: Harper and Row Publishers, 1941.

- Lillywhite, Harold S. and Bradley, Doris P. Communication Problems in Mental Retardation: Diagnosis and Management. New York: Harper and Row, 1969.
- McCarthy, James J. and Kirk, Samuel A. The Construction, Standardization, and Statistical Characteristics of the Illinois Test of Psycholinguistic Abilities. Urbana, Illinois: University of Illinois Press, 1963.
- Paraskevopoulos, John N., and Kirk, Samuel A. The Development and Psychometric Characteristics of the Revised Illinois Test of Psycholinguistic Abilities. Urbana, Illinois: University of Illinois Press, 1969.
- Rawson, Margaret B. Developmental Language Disability: Adult Accomplishments of Dyslexic Boys. Baltimore: The John's Hopkin's Press, 1968.
- Rosenberg, Sheldon and Koplín, James H. "Introduction to Psycholinguistics." Directions in Psycholinguistics. Edited by Sheldon Rosenberg. New York: The MacMillan Co., 1967.
- Schuell, H.; Jenkins, J.; and Jimenez-Pabon, E. Aphasia in Adults, Diagnosis Prognosis, and Treatment. New York: Harper and Row, 1967.
- Shane, Harold G.; Reddin, Mary E.; Gillespie, Margaret C. Beginning Language Arts Instruction with Children. Columbus, Ohio: Charles E. Merrill, Inc., 1961.
- Smith, Helen K., Ed. Perception and Reading. Newark, Delaware: International Reading Association, 1967.
- Smith, Nila Blanton, Ed. Current Issues in Reading. Newark, Delaware: International Reading Association, 1969.
- Stauffer, Russell G. The Language-experience Approach to the Teaching of Reading. New York: Harper and Row, 1970.
- Strickland, Ruth G. The Language of Elementary School Children. Indiana University: Bureau of Educational Studies and Testing, 1962.
- Underwood, Benton J., et al. Elementary Statistics. New York: Appleton-Century-Crofts, Inc., 1954.
- Vilscek, Elaine C., Ed. A Decade of Innovations: Approaches to Beginning Reading. Newark, Delaware: International Reading Association, 1967.
- Wardeberg, Helen L. The Teaching of Reading. Albany, New York: Bureau of Elementary Curriculum Development, 1965.

PERIODICALS

- Bateman, Barbara D. "Learning Disabilities--Yesterday, Today, and Tomorrow." Exceptional Children, XXXI (April, 1964), 167-177.
- _____. "The Role of the Illinois Test of Psycholinguistic Abilities in Differential Diagnosis and Program Planning for the Mentally Retarded." American Journal of Orthopsychology, XXXV (May, 1965), 465-472.
- _____, and Wetherell, Janis. "Psycholinguistic Aspects of Mental Retardation." Mental Retardation, III (April, 1965), 8-13.
- Ferrier, E. E. "An Investigation of the Illinois Test of Psycholinguistic Abilities." Exceptional Children, XXXII (May, 1966), 625-629.
- Hurley, Oliver L. "Perceptual Integration and Reading Problems." Exceptional Children, XXXV (November, 1968), 207-215.
- Kass, Corrinne E. "Psycholinguistic Disabilities of Children with Reading Problems." Exceptional Children, XXXII (April, 1966), 533-539.
- Kirk, Samuel A. and Bateman, Barbara D. "Diagnosis and Remediation of Learning Disabilities." Exceptional Children, XXIX (October, 1962), 73-78.
- _____, and McCarthy, J. J. "The Illinois Test of Psycholinguistic Abilities--An Approach to Differential Diagnosis." American Journal of Mental Deficiency, LXVI (November, 1961), 399-412.
- McCarthy, James J. "The Importance of Linguistic Ability in the Mentally Retarded." Mental Retardation, II (April, 1964), 90-96.
- Olson, James L; Hahn, Hans R.; and Hermann, Anita L. "Psycholinguistic Curriculum." Mental Retardation, III (April, 1965), 14-17.
- Painter, Genevieve. "The Effect of a Rhythmic and Sensory Motor Activity Program on Perceptual Motor Spatial Abilities of Kindergarten Children." Exceptional Children, XXXIII (October, 1966), 113-116.
- Ragland, G. G. "The Performance of Educable Mentally Handicapped Students of Differing Reading Ability on the Illinois Test of Psycholinguistic Abilities." Selected Convention Papers, 44th Annual CEC Convention, Washington, D.C.: Council for Exceptional Children, 1966, 69-72.

- Sommers, Ronald K. et al. "Effects of Speech Improvement and Speech Therapy Upon Articulation and Reading." Journal of Speech and Hearing Disorders, XXVII (February, 1961), 27-38.
- _____. et al. "Effects of Various Durations of Speech Improvement Upon Articulation and Reading." Journal of Speech and Hearing Disorders, XXVII (February, 1962), 54-60.
- Spicker, Howard H. et al. Diagnostically Based Curriculum for Psychosocially Deprived, Preschool, Mentally Retarded Children: Interim Report," Exceptional Children, XXXIII (December, 1966), 215-220.
- Wiseman, Douglas E. "A Classroom Procedure for Identifying and Remediating Language Problems." Mental Retardation, III (April, 1965), 20-24.
- Wood, Barbara Sundene. "Implications of Psycholinguistics for Elementary Speech Programs." Speech Teacher, XVII (September, 1968), 183-192.
- Zisk, Paulette Kindler and Bialer, Irvin. "Speech and Language Problems in Mongolism: A Review of the Literature." Journal of Speech and Hearing Disorders, XXXII (August, 1967), 228-231.

UNPUBLISHED MATERIAL

- Horner, R. D. "A Factor Analysis Comparison of the Illinois Test of Psycholinguistic Ability and Parsons Language Sample with Mentally Retarded Children." Kansas State College of Pittsburg. Unpublished Master's Thesis, 1967.
- Perkins, Charlotte. "Survival Kit for Student Therapists and Co-operating Teachers". University of North Carolina at Greensboro, 1969.
- Strunk, D. K. "An Analysis of the Psycholinguistic Abilities of a Selected Group of Mongoloids." Unpublished Doctoral Dissertation. University of Virginia, 1964.

OTHER SOURCES

- Council for Basic Education. Phonics in Beginning Reading, A Guide for Teachers and Parents. Washington, D. C., 1968.
- Montgomery County Board of Education. The Language Arts, A Guide for Elementary Schools. Montgomery County, Maryland, 1956.

TABLE 4
 Scores of Third-Grade Readers on Selected Sections
 of the Stanford Achievement Test

Subject-Grade 3	Word Meaning	Paragraph Meaning	Spelling	Word Study Skills	Grade Level Average
1	2.0	1.8	1.7	1.9	1.8
2	2.1	1.7	1.6	2.0	1.8
3	1.3	1.9	2.0	1.7	1.7
4	1.7	1.9	1.5	2.1	1.8
5	1.6	1.7	1.8	2.4	2.0
6	2.3	1.8	1.8	1.7	1.9
7	2.2	1.9	1.7	2.2	2.0
8	1.4	1.7	2.0	1.9	1.8
9	1.7	1.7	1.5	2.0	1.7
10	1.8	1.5	2.2	2.2	1.9
11	1.8	2.0	1.9	2.4	2.0
12	2.3	1.7	1.9	1.7	1.9
13	2.0	1.8	2.0	2.7	1.8
14	1.2	1.7	1.7	2.4	2.1
15	2.1	1.9	2.0	2.4	2.0
16	1.9	1.9	2.2	2.4	1.9
17	1.8	1.7	1.8	1.7	1.8
18	2.2	2.1	2.4	2.2	2.0
19	1.8	2.0	1.7	2.3	2.0
20	1.9	1.8	1.9	2.5	2.0
21	1.4	2.1	1.9	1.7	1.7
22	1.7	1.7	1.5	2.0	1.7
23	1.8	1.7	1.8	2.2	2.0
24	2.2	2.0	2.3	2.7	2.1
25	1.8	2.0	2.2	2.2	2.0
26	2.1	1.9	2.1	2.4	2.1
27	2.4	2.0	2.0	2.5	2.1

APPENDIX

TABLE 4

Scores of Thirty Inadequate Readers on Selected Subtests
of the Stanford Achievement Test

Subjects--Grade 3	Word Meaning	Paragraph Meaning	Spelling	Word Study Skills	Grade Level Average
1	1.6	1.8	2.2	1.7	1.8
2	2.1	1.7	2.2	2.4	2.1
3	1.3	1.9	2.0	1.7	1.7
4	1.7	1.9	1.5	2.1	1.8
5	1.6	1.7	2.0	2.4	1.9
6	1.5	1.8	1.5	1.7	1.6
7	1.8	2.4	1.7	2.2	2.0
8	1.6	1.7	2.0	2.0	1.8
9	1.7	1.7	1.5	2.0	1.7
10	1.7	1.9	1.9	2.3	1.9
11	1.6	2.0	2.2	1.8	1.9
12	1.8	2.0	1.9	2.4	2.0
13	1.5	1.7	1.9	1.7	1.7
14	1.7	1.9	2.0	1.7	1.8
15	1.9	1.7	1.9	1.4	1.7
16	2.1	1.4	1.5	1.4	1.6
17	2.1	1.9	2.3	1.4	1.9
18	1.9	1.9	1.5	2.4	1.9
19	1.8	1.7	1.3	1.7	1.6
20	2.6	2.1	2.4	1.5	2.2
21	1.8	2.0	1.7	2.3	2.0
22	1.5	1.2	1.9	1.5	1.5
23	1.8	2.4	2.3	2.7	2.3
24	1.7	1.7	1.3	1.9	1.7
25	1.9	2.3	1.9	2.2	2.0
26	1.8	2.0	2.3	2.3	2.1
27	1.9	2.7	2.2	2.3	2.3
28	1.6	2.1	2.1	1.5	1.8
29	2.1	2.4	2.2	2.4	2.3
30	2.5	2.6	2.0	2.0	2.3

TABLE 5

Scores of Thirty Inadequate Readers on the Illinois Test of Psycholinguistic Abilities (Revised, 1968)
 [See Key for Table 5 on Page 79]

Representational Level																			
		Auditory-Vocal									Visual-Motor								
Subjects	CA	Auditory Reception			Auditory Association			Verbal Expression			Visual Reception			Visual Association			Manual Expression		
		RS	AS	SS	RS	AS	SS	RS	AS	SS	RS	AS	SS	RS	AS	SS	RS	AS	SS
1	9-1	41	10-2	37	32	9-2	35	23	6-4	27	32	10-10	43	27	8-5	35	20	5-10	26
2	9-0	32	7-6	29	25	7-0	25	45	10-11	42	27	8-10	35	27	8-5	35	29	9-2	36
3	9-11	33	7-9	26	27	7-8	26	54	10-11	43	26	8-4	32	26	8-0	31	25	7-6	30
4	9-3	39	9-6	36	27	7-8	28	26	6-8	29	29	9-10	38	26	8-0	33	30	9-10	38
5	8-10	30	7-0	29	25	7-0	28	50	10-11	46	27	8-10	36	20	6-0	26	34	10-4	43
6	8-8	31	7-3	30	38	10-11	46	21	6-0	26	28	9-3	38	28	8-11	37	23	6-9	30
7	8-9	40	9-10	38	36	10-6	44	18	5-6	24	29	9-10	39	31	10-3	41	31	10-4	31
8	9-4	21	5-4	15	16	5-1	11	43	10-11	40	23	7-1	28	26	8-0	32	21	6-1	26
9	8-8	28	6-8	36	29	8-3	44	38	9-10	46	21	6-7	35	23	6-10	37	21	6-1	33
10	9-0	41	10-2	37	32	9-2	35	52	10-11	45	32	10-10	43	27	8-5	35	26	7-11	32
11	9-8	41	10-2	35	34	9-9	36	28	7-3	30	27	8-10	34	29	9-4	35	28	8-8	34
12	8-9	27	6-5	26	30	8-6	35	27	7-0	30	32	10-10	44	32	10-3	42	27	8-4	35
13	9-2	29	6-10	26	27	8-5	28	31	7-10	33	24	7-4	30	21	6-0	27	30	9-10	38
14	8-7	31	7-3	31	25	7-0	29	41	10-11	41	24	7-4	32	20	6-0	27	24	7-2	29
15	8-10	35	8-4	33	22	6-2	24	48	10-11	44	25	7-9	33	19	5-9	25	26	7-11	33
16	9-0	32	7-6	28	27	7-8	28	32	8-1	33	25	7-9	32	20	8-5	25	26	7-11	32
17	9-0	37	8-10	34	27	7-8	28	40	10-5	38	24	7-4	30	22	6-6	28	23	6-9	27
18	8-9	33	7-9	31	28	7-11	32	29	7-5	32	28	9-3	38	24	7-2	32	27	8-4	35
19	9-3	29	6-9	26	29	8-3	31	36	9-1	36	27	8-10	35	25	7-7	32	28	8-8	35
20	9-3	27	6-5	23	31	8-10	34	28	7-3	31	18	6-0	21	26	8-0	33	27	8-4	34
21	8-11	34	8-0	32	24	6-9	26	29	9-2	32	25	7-9	33	21	6-0	28	26	7-11	33
22	8-9	41	10-2	39	34	9-9	40	43	10-11	41	31	10-10	42	25	7-7	33	30	9-10	38
23	8-8	40	9-10	38	31	8-10	36	27	7-0	30	26	8-4	34	24	7-2	32	21	6-1	27
24	9-11	27	6-5	19	29	8-3	29	31	7-10	32	22	6-10	26	23	6-10	27	29	9-2	35
25	9-10	16	4-5	7	27	7-8	26	31	7-10	32	28	9-3	35	28	8-11	34	27	8-4	33
26	9-6	32	7-6	27	29	8-3	28	38	9-10	40	24	7-4	29	22	6-6	27	33	10-4	41
27	8-11	31	7-3	30	24	6-9	26	22	6-2	27	17	5-10	20	18	5-6	24	20	5-10	26
28	8-11	44	10-2	42	33	9-5	39	33	8-4	34	22	6-10	28	30	9-10	40	31	10-4	39
29	9-3	37	8-10	34	23	6-6	22	18	5-6	24	24	7-4	30	23	6-10	29	21	6-1	27
30	8-8	36	8-7	34	27	7-8	31	35	8-10	36	25	7-9	33	29	9-4	38	21	6-1	27

TABLE 5 Continued

Automatic Level											
Auditory-Vocal						Supplementary Scores					
Auditory Memory			Grammatical Closure			Auditory Closure			Sound-Blending		
RS	AS	SS	RS	AS	SS	RS	AS	SS	RS	AS	SS
34	10-3	39	33	10-4	46	22	7-11	34	22	8-7	37
26	7-2	33	32	10-2	40	23	8-5	36	22	8-7	37
19	5-3	27	28	9-2	33	23	8-5	35	24	8-7	39
32	9-10	37	26	8-6	32	25	10-1	40	17	7-4	32
34	10-3	39	25	8-2	32	23	8-5	36	12	6-2	26
24	6-6	32	28	9-2	38	19	6-5	29	12	6-2	26
32	9-10	38	32	10-4	45	29	10-0	48	27	8-7	43
17	4-10	26	28	9-2	35	21	7-3	32	19	7-10	34
24	6-6	35	28	9-2	49	22	8-4	40	24	8-7	48
42	10-3	44	29	9-8	38	26	10-0	42	19	7-10	34
34	10-3	38	27	8-10	31	27	10-0	44	16	7-1	30
23	6-3	31	26	8-6	34	21	7-3	33	14	6-8	28
21	5-8	29	21	7-0	22	18	6-1	26	19	7-10	34
23	6-3	31	28	9-2	37	24	9-4	39	18	7-7	34
26	7-2	33	25	8-2	32	20	6-9	31	20	8-2	35
17	5-3	28	26	8-6	32	22	7-11	34	18	7-7	33
26	7-2	33	26	8-6	32	19	6-5	28	18	7-7	33
24	6-6	32	25	8-2	32	25	10-0	40	21	8-7	36
26	7-2	33	19	6-5	18	21	7-3	32	18	7-7	33
19	5-3	28	28	9-2	36	21	7-3	32	19	7-10	34
27	7-7	34	24	7-2	30	19	6-5	29	6	4-2	20
24	6-6	32	29	9-8	40	27	10-0	44	23	8-7	38
26	7-2	33	33	10-4	47	29	10-0	48	30	8-7	46
35	10-3	39	22	7-3	19	24	9-4	37	15	6-11	29
26	7-2	32	24	7-11	24	25	10-0	39	15	6-11	29
35	10-3	39	31	10-4	42	19	6-5	27	22	8-7	37
38	10-3	42	27	8-10	36	22	7-11	35	15	6-11	30
27	7-7	34	31	10-4	44	26	10-0	42	21	8-7	36
27	7-7	34	27	8-10	34	27	10-0	44	19	7-10	34
34	10-3	37	25	8-2	32	25	10-0	40	16	7-1	31

TABLE 5 Continued

Summary Scores										
Visual Memory			Visual Closure			Sum	Composite Psycholinguistic	Sum	Mean	Median
RS	AS	SS	RS	AS	SS	RS	PLA	SS	SS	SS
15	5-7	25	28	8-3	33	285	8-5	346	35	35
20	7-3	32	21	6-6	26	284	8-5	333	33.3	34
13	5-1	21	27	8-0	30	278	8-2	299	30	30
17	6-2	28	23	7-0	28	275	8-1	327	33	34.5
18	6-6	30	33	9-10	39	296	8-10	348	35	34
16	5-10	27	22	6-9	28	259	7-7	332	33.2	31
16	5-10	27	38	10-6	45	303	9-1	372	37	38.5
22	8-4	35	34	10-6	38	251	7-4	286	29	30
20	7-3	39	33	9-10	49	265	7-10	403	40	38
10	4-4	17	32	9-4	37	323	10-1	363	33	37
18	6-6	28	35	10-6	38	301	9-0	339	34	35
20	7-3	33	38	10-6	45	282	8-4	355	36	34.5
18	6-6	30	34	10-6	39	256	7-6	302	30	29.5
20	7-3	34	27	8-0	38	263	7-9	329	33	32.5
14	5-4	24	20	6-4	26	260	7-8	307	31	32.5
16	5-10	26	34	10-6	39	257	7-7	303	30	30
24	10-5	39	31	9-0	36	280	8-3	327	33	30.5
18	6-0	30	31	9-0	37	267	7-10	331	33	32
17	6-2	28	38	10-6	43	274	8-0	317	32	32.5
14	5-4	23	27	8-0	32	245	7-3	295	30	31.5
22	8-4	36	18	5-10	24	250	7-4	308	31	32
13	5-1	22	18	5-10	24	288	8-6	351	35	39.5
10	4-4	17	34	10-6	40	272	8-0	334	33	33.5
14	5-4	23	34	10-6	37	266	7-10	286	29	28
9	4-1	14	25	7-6	27	241	7-1	264	26	27.5
12	4-10	20	35	10-6	40	291	8-7	333	33	33
12	6-2	20	24	7-2	30	233	6-10	281	28	26.5
12	4-10	20	19	6-1	25	282	8-4	345	35	36.5
19	6-10	31	33	9-10	38	252	7-5	303	30	30.5
18	6-6	30	20	6-4	26	270	7-11	326	33	32.5

KEY FOR TABLE 5

CA - Chronological Age

RS - Raw Score

AS - Age Score

SS - Scaled Score

PLA - Psycholinguistic Age