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An Intercorrelation Analysis of the ITPA and Feature Finders

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AN INTERCORRELATION ANALYSIS OF THE ITPA AND FEATURE FINDERS

(TITLE)

BY

DEBRA BETTS BORK

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CHAPTER 1

INTRODUCTION

A competent language therapist's major and initial responsibility is diagnosis and appraisal (The How of Language Therapy, 1970). Early and accurate diagnosis of each child's specific language problems is necessary for developing the best therapeutic program possible (Brennecke, 1974). Early diagnosis specifies that these problems be diagnosed as soon as possible and preferably at the preschool level. An accurate diagnosis infers that the diagnostic tools are reliable and valid. The clinician needs to find a baseline behavior for the child. A child's performance on various attributes of language-related behaviors would give the clinician a good overview of his problem (Keenan, 1971). Diagnostic tools which incorporate these various attributes of language-related behaviors give the language therapist a proper basis from which to begin a relevant language program.

One test that fits these criteria is the Feature Finders; another is the Illinois Test of Psycholinguistic Abilities (ITPA). The first edition of the Feature Finders was developed by Miner

and Griffith in 1968. It has since been revised to its present form. The Feature Finders is a test that focuses on sources of linguistic content, the environment, specifically those features that comprise the environment in which one functions (Keenan, 1971). For teachers-clinicians, the Feature Finders serves two purposes; 1) to assess a child's performance for various attributes of language behavior, and 2) to teach these attributes in a structured manner using appropriate stimulus material. It is to be used with any population for whom there is a question about linguistic performance. Normative data for three and one-half, four, and four and one-half year olds was established by Keenan in 1971. Keenan found the Feature Finders to be clinically useful in identifying the potential remedial language population at ages three and one-half and four. However, Feature Finder scores for four and one-half year olds were platykurtic and minimally skewed, indicating that the Feature Finders might not be as clinically useful in identifying the potential clinical population for this age child. In 1972, Carson established the temporal reliability of the Feature Finders. Temporal reliability is a measure of the stability of of an individual's score over time and it is generally a fair indication of a test's reliability (Lyman, 1964, p. 37). Reliability coefficients were .98 for three and one-half and four year olds, and .99 for four and one-half year olds. These coefficients are generally higher than one normally finds on a test. In her conclusion, Carson states that if validity coefficients are equally high, the Feature Finders would be an excellent global test of language. Validity has not been established

at this time.

The ITPA measures linguistic deficiencies involving several dimensions of language learning (The How of Language Therapy, 1970). The psychological 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 (Paraskevopoulos and Kirk, 1969, p. 11). It attempts to interrelate the processes which take place, for example, when one person receives a message, interprets it, or becomes the source of a new signal to be transmitted. It deals with psychological functions of the individual which operate in communications activities (Paraskevopoulos and Kirk, 1969, p. 11). The clinical model of the ITPA is an adaptation of a communication model by Osgood (1957). Some alterations were made in the model to make it more applicable in construction of the test. The model is three-dimensional and contains: (1) the channels of communication including auditory and visual input, and verbal and motor response; (2) psycholinguistic processes, including reception, association, and expression; and (3) levels of organization, including the automatic and representational levels (Paraskevopoulos and Kirk, 1969, p. 12). The ITPA is highly standardized (Berry, 1969). Reliability and validity data has been collected on a number of different populations. Extended research in concurrent and predictive validity is still needed.

The purpose of this study is to statistically determine the relationship between the ITPA and the Feature Finders through

measures of intercorrelation among their subtest scores and total scores for preschool children age four years. This data is important to the clinician who needs a differential diagnostic test battery to test preschool language. For example, if the total test score correlation between two tests is high, the use of both tests in a battery would be unnecessary. The use of the test that takes the least amount of time to administer would seem to be indicated. On the other hand, if the correlation between total test scores is low, it might be concluded that the two tests are examining different aspects of language-related behaviors.

STATEMENT OF PURPOSE

The purpose of this investigation is to determine the correlations between subtests of the ITPA and Feature Finders and between total test scores of the same two tests for normal children age four. Analyses will then be made of the resulting statistical charateristics. Estimates of error will also be examined. In analyzing the data the following questions will be answered.

1. Do statistically significant differences exist for the total test score correlation of the Feature Finders and the ITPA, between boys and girls?
2. What is the shape of the distribution of Feature Finder scores for this population of preschool children ranging in age from 3-10 to 4-2?
3. What is the relationship between the subtests of the Feature Finders and the ITPA?
4. What is the relationship between the total test scores of the ITPA and the Feature Finders?
5. What is the standard error of the mean for the sample on the Feature Finders?
6. What is the standard error of the measure for the sample on the Feature Finders?

CHAPTER II

SURVEY OF THE LITERATURE

This chapter will be divided into two sections. The first section will be based on the ITPA, its purposes, norms, strengths, and weaknesses. Included will be summaries of studies made on the instrument and a comparison of their findings to the Buros Reviews (1972 ed.). The second section will be a comparison of the functions tested in the subtests of the ITPA and the Feature Finders.

Section I

The original ITPA and its revision were conceived as a diagnostic rather than a classificatory tool (Examiners Manual, ITPA, p. 5). Its objective is to delineate specific abilities and disabilities in children in order that remediation may be undertaken when needed (Examiners Manual, ITPA, p. 5). The test materials are packaged in a durable carrying case and include: the administration manual; Paraskevopoulos and Kirk's book, The Development and Psychometric Characteristics of the Revised ITPA; two picture books of test materials; chips, tray, and pictured sequences for the Visual Sequential Memory subtest;

dispensable picture strips and scoring tissues for the Visual Closure subtest; six objects for the Verbal and Manual Expression subtests; a 33 1/3 rpm instruction record; and twenty-five record forms.

Individual administration of the twelve subtests takes approximately 45 to 60 minutes. Only the Visual Sequential Memory and Visual Closure subtests are timed. Directions for administration must be followed closely and can be found in the administration manual. Responses are taken from the subject only on items between his basal and ceiling. Scoring of the test is objective and takes little time. Norms can be found in the Examiner's Manual for children two to ten years (p. 102-127). There are three tables of norms available: Table 1 - Psycholinguistic Age Norms for the ITPA subtests; Table 2 - Scaled Score Norms for the 12 subtests; and Table 3 - Composite Psycholinguistic Age Norms (from the 10 basic subtests) (Examiner's Manual, ITPA, p. 92). Several derived scores can be obtained: Raw Score; Psycholinguistic Age (PLA); Scaled Score (SS); Composite PLA; Mean SS; and Median SS (Examiner's Manual, ITPA, p. 92). To provide a graphic representation of the child's abilities on the various subtests, the Record Form also provides a page entitled Profile of Abilities (Examiner's Manual, ITPA, p. 93). A book entitled Psycholinguistic Learning Disabilities by Samuel and Winifred Kirk (1971) is available and is very helpful in the interpretation of various profiles and patterns of disabilities.

Various weaknesses are pointed out by a reviewer, Clinton I. Chase, in Buros. The following points about the test are

contended: 1) scores hold up only fairly well with time; 2) the standardization group has a "middle America" bias, with minority groups clearly underrepresented; and 3) much research is needed before confident statements can be made concerning validity (Buros Reviews, 1972 ed., p. 824).

Strengths of the test that were pointed out are: 1) the revised ITPA allows the examiner to assess psycholinguistic behavior in more detail than the earlier edition, and does it with moderate reliability and with a fairly stable profile of scores; 2) it has been carefully constructed; and 3) it goes far toward extending the psychometrist's abilities to diagnose learning difficulties effectively (Buros Reviews, p. 824).

Since the 1968 edition of the ITPA little research has been done on the ITPA concerning validity and temporal reliability. Paraskevopoulos and Kirk (1969) pointed out the need to collect information on the reliability, differential performance, and validity of different groups of children with whom the test is going to be used, i.e. retardates, culturally disadvantaged, learning disabilities, and preschoolers (p. 190). They also point out the need for studies to determine concurrent and predictive validity, and stability data for varied time intervals and different degrees of profile discrepancies (Paraskevopoulos and Kirk, pp. 195 & 196). Despite this call for research in these areas most of the studies on the 1968 revised edition have been set up using the ITPA as the principle instrument for diagnosis and measurement of learning. It would seem that in their haste to get on the language program bandwagon of the mid-60's, clinicians simply assumed that the ITPA, being the only

test of global language, was without fault. Another reason for the lack of additional research could be due to statements like the following.

> Many statistical and research studies have utilized the experimental edition and preliminary findings suggest that parallel research using the two editions point to similar conclusions (Kirk and Kirk, p. 25).

Thus a great deal of research has yet to be completed. The studies that have been completed in the areas prescribed by Chase and Kirk show promising results.

SUMMARY OF STUDIES AND COMPARISONS

The following study was made by Ruth Waugh, (1973). Thirty six-year-old children served as subjects and it is a comparison of their test-retest coefficients on the experimental and revised editions of the ITPA. A two week interval was used between tests. The author found the same general magnitude of test-retest coefficients as reported for subtests of each edition (Waugh, 1973, p. 236). She speculates that performance on one edition may be used interchangeably with other for some purposes and that summaries by Bateman as well as individual studies with selected populations should be re-examined for use in interpretation of scores on the revised edition (Waugh, 1973, p. 236).

In a critical review of the findings of this study, Chases' point concerning stability is brought into view. The study he used to make his point was Kirk's standardization data and was conducted with a five to six month interval for ages four, six, and eight. Scores held up only fairly well with time (Buros Reviews, 1972 ed., p. 824). However, Waugh states that correla-

tion coefficients derived from empirical data generally fall within the range designated as substantial or marked relationship coefficients (.40 - .70) representing subtest reliability and those representing the relationship between subtests of the two editions fell with this range (Waugh, 1973). One should keep in mind that stability coefficients reflect: a) the precision of the test as a measuring instrument; b) day-to-day stability of the examinee's performance; and c) stability of the trait measured (Paraskevopoulos and Kirk, 1969, p. 107). ITPA subtest reliability has been redeemed here, however, Kirk's call for research for varied time interval data and validity data has yet to be accomplished.

Study #2

In this study by Huizinga, 100 six-year-old children of an average socioeconomic background were used to find the relationship of the ITPA to the Stanford-Binet and Wechsler Intelligence Scale for Children (WISC). Analysis of the results indicated that in order to save time, a clinician can use the appropriate estimation formulas to obtain an approximation of a Stanford-Binet IQ or a WISC Full Scale IQ from the Psycholinguistic Quotient (PLQ) obtained from the ITPA (Huizinga, 1973, p. 451).

This study is a step in the right direction for substantiating the concurrent and predictive validity of the ITPA. Notwithstanding the lack of validity and reliability studies on the revised ITPA, it is the accepted test in determining psycholinguistic abilities and disabilities.

Studies #3A - Severe Reading Disabilities

Corrine Kass (1966) found that there is a relationship between difficulty in learning to read and performance on tests at the automatic level, including tests of perceptual speech, closure, and visual memory (Kirk & Kirk, 1971, p. 27).

Macione (1969) conducted a similar study with 28 disabled and 28 nondisabled readers in the second and third grades using the revised edition (1968) of the ITPA. Five of the automatic level tests were lower for the disabled group. Macione and Kasses' studies showed similar results (Kirk & Kirk, 1971, p. 28).

Ragland (1964) and McLeod (1965) also indicate that the deficits as tested by the ITPA are primarily at the automatic level for children, with reading disabilities (Kirk & Kirk, 1971, p. 28).

Studies #3B - Speech Disorders

Ferrier (1966) and Foster (1963) conducted independent studies on the relationship of subtests of the ITPA to articulation disorders among young school children. They found that these children show a deficiency in the integrational or automatic level with an additional deficiency in vocal encoding (Kirk & Kirk, 1971, p. 29).

Studies #3C - Mental Retardation

Studies by McCarthy (1965), Wiseman (1965), and others indicate that mentally retarded children, also have lower scores on tests at the automatic level than at the representational level. These children are especially deficient in visual and auditory sequential abilities (Kirk & Kirk, 1971, p. 30).

Studies #3D - Mongoloid Children

In studies by Bilovsky and Share (1965), and McCarthy (1965), Mongoloid children were found to be superior in motor encoding compared to their other abilities (Kirk & Kirk, 1971, p. 31).

Studies #3E - Cerebral-Palsy

Studies show cerebral-palsied children to be significantly inferior to noncerebral-palsied on the ITPA. Spastic children show superiority to athetoids at the automatic level (Kirk & Kirk, p. 33).

Studies #3F - Ethnic Groups

Ryckman (1966) found that Black children from middle-class homes show superior ability on all subtests as compared to Black children from lower socioeconomic homes. Both lower- and middle-class Black children show superiority over white children in auditory sequential memory (Kirk & Kirk, 1971, p. 34).

In a 1969 study, using the ten basic subtests of the revised ITPA, the resulting profile for Black children showed superiority in auditory sequential memory. Mexican-American children showed superiority in visual sequential memory (Kirk & Kirk, 1971, p. 35).

Lombardi (1970) studied the Papago Indian children and found them to be significantly lower on all subtests than the standardization population except visual sequential memory, on which they were significantly superior (.05 level). Their basic deficiencies were in the auditory-vocal channel (Kirk & Kirk, 1971, p. 34). In a study by Garber in 1968, using the experimental edition, Navajo children were also found to show superiority of visual sequential ability (Kirk & Kirk, 1971, p. 35).

Studies have also been conducted using children with sensory handicaps. Although minority groups were under-represented in the standardization group the data that has been accumulated in the above areas gives the examiner baseline profiles to which she can refer for interpretation of ITPA test results. These results also fulfill the request by Paraskevopoulos and Kirk for research in these areas.

Section II

As has been stated previously the ITPA is based on a communications model which is three-dimensional. The level of organization separates into a representational and automatic level. Those functions tested at the representational level are assessed in the following subtests: 1) auditory reception; 2) visual reception; 3) auditory association; 4) visual association; 5) verbal expression; and 6) manual expression. The following statements of function are from Paraskevopoulos and Kirk (pages 28 - 49). Auditory reception is a test to assess the child's ability to derive meaning from verbally presented material. Visual reception measures the child's competence to gain meaning from visual symbols. The auditory association subtest taps the child's ability to relate concepts presented orally. Visual association measures the child's capability in relating concepts presented visually. The purpose of the verbal expression test is to assess the ability of the child to express his own concepts vocally. Manual expression is used to show the subjects competence to express ideas manually.

Functions tested in the six ITPA subtests at the Automatic

Level are those which measure the child's ability to perform non-symbolic tasks. The grammatic closure subtest assesses the child's ability to make use of the redundancies of oral language in acquiring automatic habits for handling syntax and grammatic inflections. The supplementary test of auditory closure measures the child's ability to fill in missing parts which were deleted in auditory presentation and to produce a complete word. In the supplementary test sound blending the child has to synthesize the separate parts of a word and produce an integrated whole. The subtest on visual closure assesses the child's ability to identify a common object from an incomplete visual representation. Auditory sequential memory tests the subject's competence to reproduce from memory sequences of digits increasing in length from two to eight digits. The test of visual sequential memory taps the child's capability to reproduce sequences of nonmeaningful figures from memory.

The individual subtests of the Feature Finders gives the clinician a view of the child's baseline performance in the following feature areas:

1. Spacial Relationships (expressive and receptive)
2. Gross Color (spontaneous, expressive, and receptive)
3. Visual Memory (visual sequencing, attention to order)
4. Negative Functions (receptive)
5. Fine Color Discrimination (sequencing, terminal words in a continuum)
6. Numeric Relationships (number names, expression and reception, equivalence, and conservation)
7. Visual Closure (attention to visual pattern)
8. Puzzle Assembly (attention to a model and imitation, size discrimination, use of verbalization as a mediator for problem solving)
9. Problem Solving
10. Temporal Relationships (auditory memory, auditory pattern discrimination)

11. Shape (tactile discrimination for shape, ability to match tactually an object presented visually, visual closure)
12. Texture (tactile discrimination for texture, ability to match without vision a texture to one held in the other hand with taction and vision); (Brennecke, 1974).

One would expect the highest agreement between the functions tested by the ITPA and Feature Finders subtests to be found between: 1) Visual Sequential Memory of the ITPA and the Visual Memory of the Feature Finders: 2) Visual Closure of the ITPA and Visual Closure of the Feature Finders; 3) Auditory Sequential Memory of the ITPA and Temporal Relations of the Feature Finders. A moderate amount of agreement might be expected between the following subtests: 1) Visual Sequential Memory and Grammatic Closure of the ITPA and Fine Color Discrimination of the Feature Finders; 2) Auditory Reception and Grammatic Closure of the ITPA and Negative Functions of the Feature Finders.

CHAPTER III

PROCEDURE

Selection of Subjects

Thirty subjects age four were selected from the available population of preschoolers in the Central Illinois Area. The children were randomly selected from those sources who were willing to cooperate. The following table illustrates the location of the population.

TABLE 1

LOCATION OF POPULATION

Source	Location	N
Charleston Community Day Care Center	Charleston	3
Raggedy Land	Charleston	1
Adult Extension Center Nursery School	Mattoon	4
Busy Bee School	Mattoon	11
La Petite Academy	Mattoon	3
Mattoon Day Care Center	Mattoon	8
Other		1
		30 Tot.

Each child age four had an equal opportunity for being chosen. The population was placed in categories according to sex, for

comparison. This division is displayed in the following table.

TABLE 2

AGE AND SEX DISTRIBUTION

Age	Males	Females	Total
3,10 - 4,2	17	13	30

Selection of Examiners

(The following two sections are a replication of Keenan's sections on examiner training and test environment.) Two examiners were selected from the Department of Speech Pathology and Audiology of Eastern Illinois University. Both were trained in the area of Speech Pathology, had had the language measurement class (SPA 3250), and were trained by special training sessions conducted by the author in the use of the Feature Finders. Studies by past authors Keenan and Carson indicate high examiner reliability for the Feature Finders. Because of this, the author and two examiners each administered a Feature Finder to the first three subjects at an interval of one week between tests to ensure absence of examiner bias. Results from the administration indicated a 93% level of agreement between examiners. Appointments were set up for testing at the author's convenience and the availability of the population.

Training of Examiners

A training session was held in which the following points were reviewed.

1. Recording of responses - plus and minus.
2. Presentation of items - in order to standardize testing procedures, the method of presentation was discussed for each subtest.
3. Scoring procedures - questions concerning acceptable responses for each item were discussed.
4. Notation of verbalization during problem solving and puzzle assembly subtests.
5. Test forms - each examiner was supplied with test forms, and the information contained within them was discussed:
   a. identification outline;
   b. score sheet;
   c. verbal directives and specification of materials for each item.
6. Responsibilities of examiner - to score and total all responses for the children they tested.

As a method of establishing interexaminer reliability, a videotaped administration of the Feature Finders was played for the examiners and they were asked to score the test as they would if they were the administrator. Their results were correlated and the examiners showed a statisticallly significant level of agreement (98%). If they had not reached a 95% level of agreement they would have to have been retrained.

The investigator administered the ITPA's. Examiner reliability should not have been affected due to the excellent standardization of the ITPA and the extensive testing the author has done with it. (The author first gave twelve practice tests and was then employed as a diagnostician for the Augustana Summer Center, where she administered a minimum of one hundred and twenty ITPA's.)

Testing Environment

A non-distracting setting was sought and found in all locations with individual testing situations free of people other than the examiner and the subject.

Statistical Analysis

The questions posed in the statement of purpose were answered according to the following procedures.

1. Do statistically significant differences exist for the total test score correlation of the Feature Finders and the ITPA between boys and girls?

A test of significant difference between correlations was used (H. Blalock, 1972, p. 405).

2. What is the shape of the distribution of Feature Finder scores for this population of preschool children ranging in age from 3-10 to 4-2?

Measures of central tendency and dispersion were determined for the sample of Feature Finder scores. Measures of skewness and kurtosis were also computed to determine distribution of shape.

3. What is the relationship between the subtests of the Feature Finders and the ITPA?

The Pearson r was used to determine to what extent the scores vary together and in what direction they vary (Hoel, 1962, p. 165). To further determine clinical meaningfulness the coefficient of determination was used.

4. What is the relationship between total test scores of the ITPA and Feature Finders?

The Pearson r and coefficient of determination were used here, also.

5. What is the standard error of the mean for the sample on the Feature Finders?

The standard error of the mean reveals how much variance would exist in the means of one sample compared to the means of another sample if they were retested.

6. What is the standard error of the measure for the sample on the Feature Finders?

The standard error of the measure reveals deviations that would be found if individuals were retested. This measure gives an estimate of how much individual scores would vary from a persons true score.

CHAPTER IV

RESULTS AND DISCUSSION

Feature Finder and ITPA scores were obtained for a population of 30 preschool children in the Central Illinois Area. Statistical measures were applied in order to answer the questions posed at the onset of this investigation. Test results were examined in terms of sex differences, characteristics of the distribution, relationship between the subtests of the ITPA and Feature Finders, relationship between total test scores of the ITPA and Feature Finders, standard error of the measure, and standard error of the mean.

Sex Differences

An initial comparison was made for sex difference, because if a significant difference was found the data for males and females would have to be dealt with separately throughout the investigation. The first step, was to obtain the mean and standard deviation for Feature Finder total test scores for males and females. The mean for females was 44.0 and the standard deviation was 8.38. The Feature Finder total test score mean for males was 47.3 with a standard deviation of 5.80. These are consistent with

Keenan's results (1971, p. 32). A *t* was then computed to determine if there was a significant difference between the means of males versus females. A nonsignificant *t* of 1.248 was obtained. The scores of boys and girls were thus indicative of the same population.

Next, the mean and standard deviation were obtained for the ITPA total test scores for boys and girls. The mean for females was 110.385 and the standard deviation was 26. The ITPA total test score mean for boys was 116.647 and the standard deviation was 18.21. A *t* test was run and a nonsignificant *t* of 0.748 was obtained. The scores for boys and girls on the ITPA were also indicative of the same population.

A *z* score was then obtained by testing the difference between ITPA and Feature Finder total test score correlations for boys versus girls. A test of significant differences between correlations was used (H. Blalock, 1972, p. 405). A resultant *z* score of .555 was obtained. (To be significant the *z* score would have to have been ± 1.96.) Thus, the scores for boys and girls were representative of the same population.

Characteristics of the Distribution

Distribution is described in three ways: central tendency, variability, and shape. In any uni-modal symmetrical distribution, the values of mean, median, and mode, are the same. This is true because the same point on the baseline occurs frequently (mode), divides the number of cases into the upper and lower fifty percent (median), and is the point of balance (mean). Variability is described by using the statistic termed standard deviation, which indicates how scattered scores are. These two measures along

with the range of scores were calculated for the Feature Finder scores and are shown in Table 3.

TABLE 3

MEASURES OF CENTRAL TENDENCY

Age	Range	Mean	Mdn. & Mo.	SD
4	30 - 64	45.9	46	7.10

In order to understand an overall performance of the sample on the test, it is necessary to determine the shape of the distribution of the scores, in terms of measures of skewness and kurtosis (Keenan, 1971). Skewness is used to define the symmetry of the distribution. An obtained value of greater than ± 0.50 is indicative of considerable skewness. For clinical purposes it is much more desirable to have a symmetrical distribution to which scores can be compared to indicate which cases should make up the potential clinical population.

Kurtosis refers to the relative flatness or peakedness of a distribution. In general unimodal symmetrical curves may be either more peaked or more flat than the normal curve even though their standard deviations are all the same. Curves which are more peaked than the normal or mesokurtic curve are referred to as leptokurtic, and those which are flatter than normal as platykurtic. According to Griffin, a value exceeding ± 0.50 is considered to indicate considerable peakedness (Keenan, 1971). When skewness and kurtosis are viewed together a complete picture of the distribution of scores for a given population is obtained.

The skewness value for the Feature Finder population was 0.158 and the kurtosis value was 0.369. Both of these values indicate an essentially "normal curve".

In conclusion, skewness and kurtosis have both been essential in showing a normal curve distribution. This is data that is especially important in interpretation of test scores. These results are consistent with Keenan's data for four year olds (1971, p. 34).

Due to the normality of this four-year-old population, the mean and standard deviation were determined for each subtest. This data can be used to better identify if the child is functioning at a normal level of readiness. The mean and standard deviation for each subtest are illustrated in the following table.

TABLE 4

MEAN AND STANDARD DEVIATION OF THE FEATURE FINDER SUBTESTS

Subtest	$\bar{X}$	SD	Subtest	$\bar{X}$	SD
1	6.00	2.05	7	1.20	0.55
2	8.00	3.60	8	2.83	1.17
3	0.33	0.66	9	0.40	0.56
4	3.30	0.74	10	1.90	1.45
5	2.03	1.09	11	7.83	1.39
6	7.70	2.00	12	4.53	0.78

Relationship Between the Subtests of the ITPA and Feature Finders

In addition to the aspects of sex difference and the descriptive measures discussed thus far, another way to view the scores obtained is to observe the relationship between the subtests of the ITPA and Feature Finders. A Pearson _r_ is a statistic used

to determine to what extent the scores vary together and in what direction they vary. Subtests that correlate highly with each other would indicate that the ITPA and Feature Finders were testing the same language-related behaviors.

However, a correlation score can be significant at the .01 level and still not account for enough of the variance to be educationally useful. Therefore, to further determine clinical meaningfulness, the coefficient of determination was used. The coefficient of determination is computed by squaring the r and subtracting that square from one. The resulting difference is the percent of variability not accounted for.

An intercorrelation matrix was prepared for the ITPA and Feature Finder subtest correlation. This can be seen in Table 5 on the following page. The table illustrates that the highest r was .727 and that it was statistically significant at the .001 level. Although this appears to indicate a high level of significance, when the coefficient of determination is computed, 47% of the variance is not accounted for. The implication is that there is very little relationship between the ITPA and Feature Finder subtests.

Relationship Between Total Test Scores of the ITPA and Feature Finders

Total test scores were viewed to observe if any relationship existed between the ITPA and Feature Finders on these measures. The Pearson r was computed in order to assess this relationship. The resultant r was .6465 with a significance level of .001. When the coefficient of determination was applied, 59% of the variance was not accounted for. Again it is implied that the same language-

TABLE 5

INTERCORRELATION MATRIX FOR SUBTESTS OF THE ITPA AND FEATURE FINDERS

FEATURE FINDER		ITPA 1	2	3	4	5	6	7	8	9	10
1	r	.647	.727	.398	.005	.483	.009	.063	.401	.392	.232
	Sig.	.001	.001	.015	.488	.003	.481	.369	.014	.016	.109
2	r	.371	.363	.227	.123	.191	-.072	-.011	-.013	.144	-.032
	Sig.	.022	.024	.114	.259	.155	.352	.478	.474	.223	.433
3	r	.247	.336	.185	.274	.405	.019	.466	.328	.286	.032
	Sig.	.094	.035	.164	.071	.013	.461	.055	.038	.063	.433
4	r	.156	.188	.034	.526	.108	.131	.159	.024	.069	-.045
	Sig.	.204	.160	.429	.001	.284	.245	.200	.450	.358	.406
5	r	-.089	.054	.228	.054	.275	.370	-.186	.008	.286	.262
	Sig.	.319	.389	.113	.389	.071	.022	.163	.483	.063	.081
6	r	.383	.225	.374	-.010	.299	.062	.113	.140	.310	.128
	Sig.	.018	.116	.021	.479	.054	.372	.275	.230	.048	.251
7	r	-.108	-.011	-.222	-.201	-.083	.074	.349	.082	-.244	-.092
	Sig.	.285	.478	.119	.143	.331	.348	.029	.333	.097	.314
8	r	.229	.452	.650	.375	-.020	-.127	.200	.215	.191	-.036
	Sig.	.112	.006	.366	.020	.458	.258	.145	.127	.156	.425
9	r	.164	.005	.217	-.072	.119	.293	.178	.273	.151	.124
	Sig.	.193	.489	.124	.352	.265	.058	.174	.072	.213	.128
10	r	.024	.318	.173	.042	.169	.185	.338	.150	-.072	.332
	Sig.	.450	.043	.181	.412	.187	.164	.034	.214	.353	.037
11	r	.098	.069	.183	.133	.047	.172	.065	.317	-.086	.046
	Sig.	.302	.359	.167	.242	.402	.182	.367	.044	.325	.404
12	r	.159	.146	.197	.201	.138	.152	-.020	.058	.040	.139
	Sig.	.201	.220	.148	.143	.233	.211	.459	.380	.418	.232

related behaviors are not being tested by these two measures.

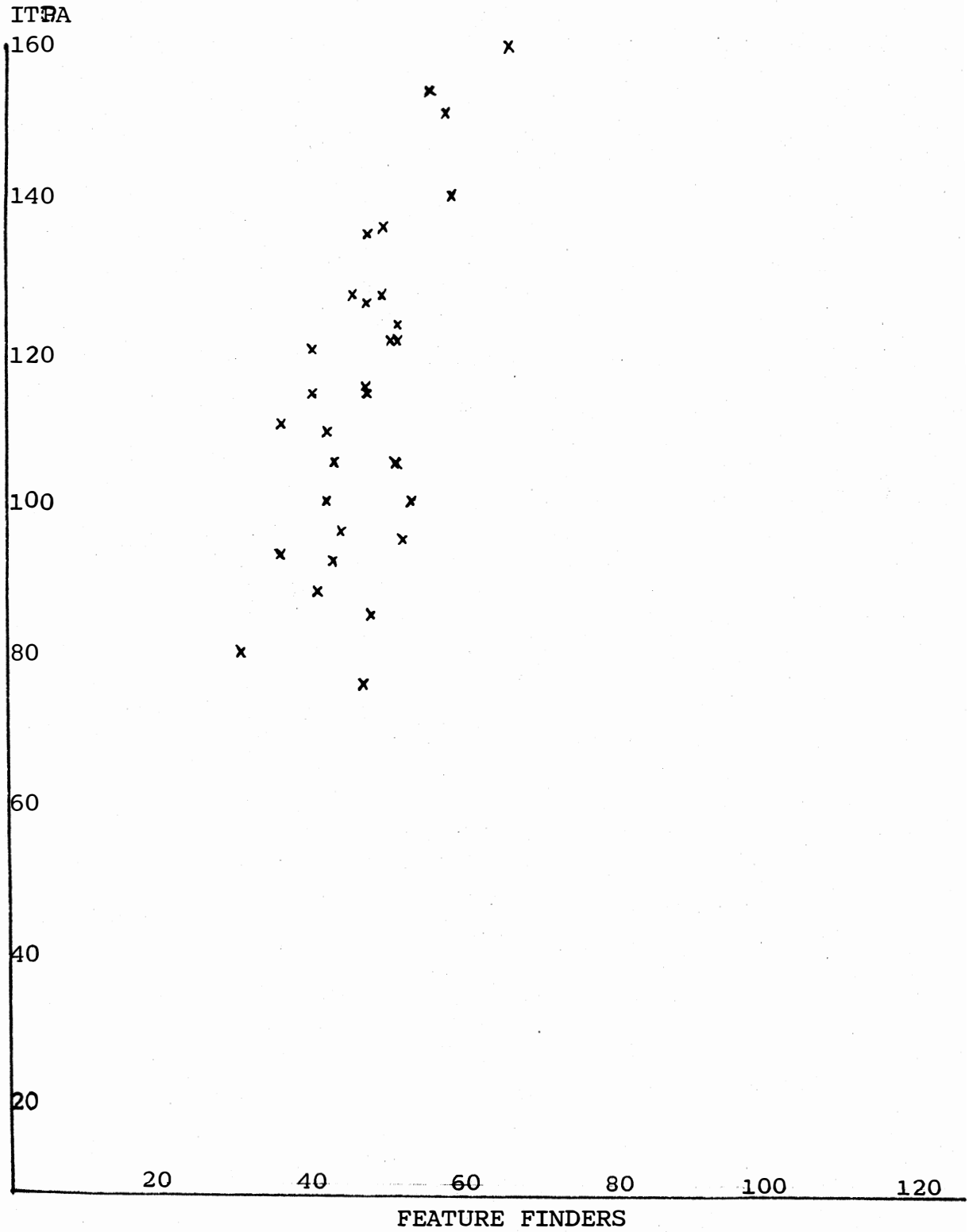
Because of the amount of variance left unaccounted for a scattergram was constructed for ITPA and Feature Finder total test scores (Figure I, page 28). The scattergram appeared to show a curvilinear relationship. To see if this was true a regression was run using ITPA total test scores as the dependent variable and Feature Finder total test scores as the independent variable in the following equation: Y(ITPA)= a + b logX(Feature Finders). This information is important in that it would be helpful in defining the clinical population by giving the Feature Finders as a screening devise and to be able to predict the ITPA total test score from it. Despite the appearance of the scattergram the resultant r of .6254 accounts for less of the variability than the total test r reported above of .6465. This indicates that the linear relationship of scores is stronger and has a greater predictive value, but the predictive value found is not high enough to adequately predict an ITPA total score from a Feature Finder score.

The scattergram also illustrates that there is a greater trend for significance if a child received both a high ITPA and Feature Finder total test score. However, only four children scored at this high level and this is not enough to obtain a statistical comparison.

This would seem to indicate that the tests could be used together in a battery of language tests. A reason for the great amount of variance between the two tests can be accounted for by the fact that the Feature Finder tests environmental concepts related to the acquisition of readiness skills - some important

FIGURE 1

TOTAL SCORES SCATTERGRAM



concepts prerequisite to academic functioning, whereas, the ITPA tests those cognitive processes necessary for communication to take place. The assumption that they can both solely be termed global tests is a false one. One must define them more closely by what they test. It would seem to the observer that there would be a high level of agreement between certain subtests of the ITPA and Feature Finders, as was thought by this author. Nevertheless, the null hypothesis of this study, that there is no relationship between the ITPA and Feature Finders, cannot be rejected on the basis of the data heretofore presented.

Variance might also be accounted for by the difference in the reliability measures of the ITPA and Feature Finders. Reliability scores for the Feature Finders don't fall below .98 (Carson, 1972) whereas, the reliability range for the ITPA is .40 to .70 (Waugh, 1973).

Further differences might be accounted for by the learning experiences provided for in the child's home and preschool setting. An argument might even be made that children who watched educational television programs such as, "Sesame Street" or "Electric Company" might do better on the types of things the Feature Finder tests and not do as well on the ITPA.

Standard Error of the Mean

In order to determine how much confidence can be placed on descriptive measures, inferential statistics must be applied (Keenan, 1971). The standard error of the mean is an inferential statistic, which reveals how much variance would exist in the means of one sample compared to the means of another sample if they were retested.

The standard error of the mean was computed for the Feature Finders and is illustrated in table six.

TABLE 6

STANDARD ERROR OF THE MEAN

Age	$\bar{X}$	SD	SEx
4	45.9	7.10	1.30

The mean for four-year-olds is 45.9 with a standard deviation of 7.102. The standard error of the mean is 1.297. The population mean for this group would be between 45.9 $\pm$1.30 or between 44.6 and 47.2, with a 68% confidence. With 95% confidence, the mean would not vary more than $\pm$2.55.

Standard Error of the Measure

The standard error of the measure is used to reveal deviation that would be found if individuals were retested. It gives an estimate of how much individual scores would vary from a persons true score. The information for Feature Finder data is displayed in the following table.

TABLE 7

STANDARD ERROR OF THE MEASURE

Age	$\bar{X}$	SEmeas
4	45.9	5.5

The standard error of the measure for four-year-olds is 5.5. An individuals true score on the Feature Finders would, therefore, lie between ±5.5 of his obtained score at the 65% confidence level. With 95% confidence the true score would be expected to vary ±10.78. This indicates a moderate amount of variability. A smaller standard error of the measure would be desirable.

The major findings of this investigation are summarized below.

Summary

A *t* was computed to determine if there was a significant difference between the Feature Finder total test score means of males versus females. A nonsignificant *t* score was obtained, which is indicative of a homogeneous population. A *t* score was also computed for the ITPA total test score means for males versus females. The scores for boys and girls on the ITPA were also indicative of the same population. To determine if there were significant sex differences between total test score correlations of boys and girls on the ITPA and Feature Finders, a *z* score was obtained. No significant difference was found for this sample of four-year-old children.

The distribution of total test scores for the Feature Finders was viewed in terms of central tendency, variability, and shape. Measures of kurtosis and skewness signified a "normal curve". This data is especially important in interpretation of test scores.

A Pearson *r* was used to assess the degree of relationship between every possible ITPA and Feature Finder subtest combination

To further determine clinical meaningfulness, the coefficient of determination was computed. An intercorrelation matrix was prepared for the ITPA and Feature Finder subtest correlation. Not one combination of the ITPA and Feature Finder subtests accounted for enough variance to indicate that they were testing the same language-related behaviors.

The relationship between total test scores of the ITPA and Feature Finders was also viewed. A Pearson r and the coefficient of determination were used to assess this relationship. The results indicated that the same language-related behaviors are not tested by these two measures. Therefore, it would seem that the two tests could be used together in a battery of language tests. This last point was further proven when the investigator upon viewing a scattergram of ITPA and Feature Finder total test scores decided to run a regression. The results indicated that the linear relationship of scores was stronger and that it has a greater predictive value, however, the predictive value found is not high enough to adequately predict an ITPA total score from a Feature Finder score.

Inferential statistics were used to determine how much confidence can be placed on descriptive measures. Both the standard error of the mean and the standard error of the measure were computed. The standard error of the mean was 1.297. The standard error of the measure was 5.5. The standard error of the mean fell well within the accepted limits and standard error of the measure shows a moderate amount of variability. A smaller standard error of the measure would be desirable.

Recommendations for Further Research

1) To find out more exactly what the Feature Finders measures, further comparison of the Feature Finders with other measures would seem to be necessary. For example, comparison might be made with the Wechsler Preschool Scale of Intelligence or the Porch Index of Communicative Abilities for Children (not yet completed).

2) Extensive study of validity is needed.

3) It would be interesting to see these results extended into a longitudinal study, to find this same data every half year until the children were six.

4) It would be of special interest to this investigator for someone to take the children that scored in the lower fiftieth percentile of this study and teach them the skills used in Feature Finder language therapy. When the training was complete they would be given these two tests again and the scores would be correlated.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this investigation was to determine the correlations between subtests of the ITPA and Feature Finders and between total test scores of the same two tests for normal children age four. Data was collected on a population of preschool shildren and the resulting statistics were analyzed. The following questions were answered:

1. Do statistically significant differences exist for the total test score correlation of the Feature Finders versus the ITPA between boys and girls?
2. What is the shape of the distribution of Feature Finder scores for this population of preschool children ranging in age from 3-10 to 4-2?
3. What is the relationship between the subtests of the Feature Finders and the ITPA?
4. What is the relationship between total test scores of the ITPA and Feature Finders?
5. What is the standard error of the mean for the sample on the Feature Finders?
6. What is the standard error of the measure for the sample on the Feature Finders?

The ITPA and Feature Finders were administered to thirty children age four. Test results were examined in terms of sex differences, characteristics of the distribution, relationship

between the subtests of the ITPA and Feature Finders, relationship between total test scores of the ITPA and Feature Finders, standard error of the measure, and standard error of the mean.

Sex differences were first assessed for each test separately by a *t* test. A *z* test was used to compute sex differences for combined test performance. The distribution of Feature Finder scores were interpreted in terms of central tendency, variance, and shape. Relationships between subtest scores of the Feature Finders and ITPA were assessed by means of a Pearson *r* and the coefficient of determination. The same tools were used to find the relationship between total test scores on the two measures. A regression was run to see if a linear or curvilinear relationship of scores was stronger. Standard error of the mean and standard error of the measure were computed and discussed.

Conclusions

The statistical analyses as outlined above resulted in the following conclusions.

1. Concerning differences in total test score correlations between boys and girls
   a. on each test separately there was no significant difference. Thus, both the Feature Finder and ITPA populations were homogeneous as far as sex.
   b. on combined ITPA and Feature Finder performance there was no significant difference. Thus, the scores for boys and girls are representative of the same population.
2. The distribution of Feature Finder scores indicated a

"normal curve".

3. Relationship between the subtests of the Feature Finders and ITPA
   a. showed no correlations over .727 - leaving 47% of the variance unaccounted for.
   b. implied that there is very little relationship between the ITPA and Feature Finder.
4. Relationship between the total test scores of the ITPA and Feature Finders
   a. revealed a correlation coefficient of .6465 - leaving 59% of the variance unaccounted for.
   b. implied that the same language-related behaviors are not being tested by these two measures and that they might be used together in a language battery.
   c. showed a stronger linear than curvilinear relationship.
   d. indicated that the ITPA total test score cannot be predicted from the Feature Finder total test score with accuracy.
   e. showed variance that can be accounted for somewhat by the fact that the Feature Finder tests environmental concepts related to the acquisition of readiness skills, whereas, the ITPA tests those cognitive processes necessary for communication to take place.
      i) This variance might also be accounted for by the high reliability of the Feature Finders and the low reliability of the ITPA; and/or the learning experiences provided by homes and schools.

5. Standard error of the mean was 1.30 and is considered to be well within the accepted limits.
6. Standard error of the measure was 5.5 and is indicative of a moderate amount of variability. A smaller standard error of the measure would be more desirable.

It seems very apparent that these two tests measure different aspects of language.

BIBLIOGRAPHY

Books

Berry, M.F. Language Disorders of Children. New York: Appleton-Century Crofts, 1969.

Blalock, Hubert M. Social Statistics. New York: McGraw Hill Book Co., 1972.

Blommers and Lindquist. Elementary Statistical Methods. Boston: Houghton Mifflin, 1960.

Brennecke, Denise. Studies in Environmental Features of Language. Unpublished Graduate Paper, Eastern Illinois University, 1974.

Carson, Rosalie. Temporal Reliability of the Feature Finders. Unpublished Master's Thesis, Eastern Illinois University, 1973.

Griffin, John I. Statistics - Methods and Applications. New York: Holt, Rinehart, and Winston, 1962.

Hoel. Introduction to Mathematical Statistics. New York: Wiley Publications, 1962.

Keenan, Nancy. The Clinical Utility of the Feature Finders. Unpublished Master's Thesis, Eastern Illinois University, 1971.

Kirk, Samuel A.; McCarthy, J. and W. Kirk. Examiner's Manual: Illinois Test of Psycholinguistic Abilities Revised Edition. Urbana: Illinois, University of Illinois Press, 1969.

Kirk, Samuel and Winifred Kirk. Psycholinguistic Learning Disabilities: Diagnosis and Remediation. Urbana: University of Illinois Press, 1971.

Lyman, H. B. Test Scores and What They Mean. N.J.: Prentice Hall, Inc., 1963.

Paraskevopoulos, John N. and Samuel Kirk. The Development and Psychometric Characteristics of the Revised Illinois Test of Psycholinguistic Abilities. Urbana: University of Illinois Press, 1969.

Articles

Bateman, Barbara. The ITPA in Current Research: Summary of Studies. Urbana: University of Illinois Press, 1965.

Chase, Clinton I. "A Review of the ITPA," in the 7th Mental Measurements Yearbook, ed. O.K. Buros (Highland Park: New Jersey, 1972), pp. 823 & 824.

Hare, Hammil and Bartel. "Construct Validity of Selected Subtests of the ITPA", Exceptional Children, Vol. 40 (September 1973), p. 13.

Huizinga, Raleigh. "The Relationship of the ITPA to the Stanford Binet - WISC", Journal of Learning Disabilities, (August, 1973), p. 451.

Mueller, Max W. "A Comparison of the Empirical Validity of Six Tests of Ability with Young Educable Retarded", Institute of Mental Retardation and Intellectual Development, Behavioral Science and Monograph No. I., (Nashville, Tenn.: Peabody College Bookstore, 1965).

McCarthy, James J. and Samuel Kirk. The Construction, Standardization and Statistical Characteristics of the ITPA. Urbana: University of Illinois Press, 1963.

McCarthy, James J. and James L. Olson. Validity Studies of the ITPA. Urbana: University of Illinois Press, 1964.

Newcomer; Hare; Hammill and McGettin. "Construct Validity of the ITPA", Exceptional Children, (April, 1974), p. 509.

Waugh, Ruth. "Comparison of the Revised and Experimental Edition of the ITPA", Journal of Learning Disabilities. (Chicago), April, 1973.

Weener, Paul; Loren Barrit and Melvyn Semmel. "A Critical Evaluation of the ITPA," Exceptional Children. (February, 1967), pp. 373-380.

Winsland, Milton. "A Study of the Stability of the ITPA", Education and Psychological Measurements. (Summer, 1967).