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ABSTRACT

Using a polygraph to determine the reading frustration level of 62 third-, fourth-, and fifth-grade students, the researchers examined several factors related to reading frustration on informal reading inventories. Two primary concerns of the study were (1) to determine whether factors of intelligence, age, sex, ethnic background, reading level, or personality type influenced the point at which the reading frustration level is reached and (2) to validate and stabilize the criteria for scoring informal reading inventories. Subjects were students in El Paso, Texas, schools, including one-third Anglo-American, one-third Mexican-American, and one-third Negro-American. Each child was tested on the Spache Diagnostic Reading Scales, an intelligence test, and two psychological tests. Among the findings were (1) that age, sex, and ethnic background did not significantly affect frustration level; (2) that reading level, intelligence, emotional control, cognitive style, and perceptual acuity did affect the frustration level; and (3) that not counting repetitions as errors resulted in a significantly different frustration level than the accepted 10 percent error, 90 percent correct. Recommendations for further research and applications of this study are made. Tables and a glossary are included. (AML)

FINAL REPORT

PROJECT No. 0G078

Grant No. OEC-6-71-0216 (509)

Use of the Polygraph to Determine Elementary School Students' Frustration Reading Level

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MAY 29, 1971

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

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Contents

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SUMMARY

This research project was designed to (1) determine by use of the polygraph the frustration reading level of a group of 62 third, fourth, and fifth grade students (2) determine whether the factors of intelligence, age, sex, ethnic background, reading level, or personality type influence the point at which students reach their frustration reading level (3) validate and stabalize the criteria for scoring informal reading inventories.

As each student read progressively more difficult passages, he was monitored by the polygraph to determine at what point he became frustrated. Three percentage scores were determined at this point. They were (1) oral reading without counting repetitions (2) oral reading counting repetitions and (3) comprehension.

Results obtained were as follows: (1) counting repetitions as errors does not result in a significantly different frustration level from the commonly accepted criteria of 10% oral errors (90%) correct (2) not counting repetitions as errors does result in a significantly different frustration level from the commonly accepted criteria of 10% oral errors (90% correct) (3) polygraph measured frustration for comprehension was significantly different from the 50% criteria (Students could miss more than 50% of the questions without becoming frustrated) (4) there was no significant difference in polygraph-measured frustration reading levels of ethnic groups; boys and girls; third, fourth, and fifth graders; and children with various means of achieving affective gratification (5) there was a significant difference both for oral errors and comprehension errors in polygraph measured frustration between good readers and both poor readers and average readers (6) there was a significant difference for oral errors in polygraph measured frustration between children of low intelligence and both children of high intelligence and children of moderate intelligence; children with impulsive cognitive style and children with mixed cognitive style; children of restricted perceptual acuity and children of expansive perceptual acuity; children with uncontrollable emotions and children with highly controllable emotions.

Based on these results, certain recommendations were made for standardizing the criteria for scoring informal reading inventories in general and for scoring informal reading inventories when given to children of low intelligence and children with high reading levels. Recommendations were also made indicating the need for further research to investigate the relationship between various personality factors and reading.

INTRODUCTION

The Problem. The two basic questions investigated were as follows: What is the true frustration reading level of a group of third, fourth, and fifth grade students? Does intelligence, age, sex, ethnic background, or personality type influence the point at which a student reaches his frustration reading level?

Purpose. The purpose of this study was to use the polygraph to validate the criteria for scoring informal reading inventories and to determine whether any one set of criteria is applicable to students of various intelligence levels, ages, sexes, ethnic backgrounds, reading levels, or personality types. This research study will also serve as a model in future research studies using informal reading inventories. That is, it will establish exactly what types of mistakes in reading will officially be counted as errors. It will also help establish whether the criteria for the frustration reading level of any one student is applicable to a group of students.

Review of the Literature and Related Research. Considerable use is now being made of the instrument called the informal reading inventory. There are several types of informal reading inventories, but due to the publication by Kress and Johnson[1] of a booklet entitled INFORMAL READING INVENTORIES the procedure for administering IRI's has become somewhat more standardized.

In terms of the Kress and Johnson description, the IRI consists of a series of graded reading passages usually ranging from pre-primer to grade six or eight. At each level there are two reading passages. One is read orally and one is read silently by the student. As the student reads orally, the testor marks the various word recognition errors made by the student. Following the reading of each passage, the testor tests the student's comprehension of the material by asking a series of questions over the subject matter in the reading passage. After the student reads each passage, his reading is graded as being at the Independent or Free level, the Instructional level, or the Frustration level according to the following criteria:

	Word Recognition	Comprehension
Independent or Free Reading Level	99% or more	90% or more
Instructional Reading Level	95% or more	75% or more
Frustration Reading Level	90% or less	50% or less

[1] Marjorie S. Johnson and Roy A. Kress, INFORMAL READING INVENTORIES, an IRI Service Bulletin, Newark, Delaware: International Reading Association, 1965.

When the student reads at either his Free or Instructional level he is likely to show the following related behavioral characteristics:[2]

Rhythmical, expressive oral reading
Accurate observation of punctuation
Conversational tone
Acceptable reading posture
Silent reading more rapid than oral
Response to questions in language equivalent to author's
No evidence of: lip movement — vocalization
finger pointing — sub-vocalization
head movement — anxiety about performance

On the other hand, when the student reads at his Frustration level he is likely to show the following related behavioral characteristics:[3]

Abnormally loud or soft voice
Rhythmical word-by-word reading
Lack of expression in oral reading
Inaccurate observation of punctuation
Finger pointing (at margin or every word)
Lip movement-head movement-sub-vocalization
Non-interest in the selection
Yawning or obvious fatigue
Refusal to continue

This, of course, enables the testor to quickly determine what level the student is reading at for purposes of proper reading placement. The criteria for the informal reading inventory is, however, more useful than the administration of an informal reading inventory per se. For example, one can simply have a student read from the material commonly used at his grade level for instructional purposes (his basal reader or his science or social studies book). After marking his word recognition errors and checking his comprehension, one immediately knows whether the student is capable of reading at the level at which the book is written. The same thing can be done to determine whether library books are too difficult for students to read.

Standardized tests are often used to determine pupil grade placement and properness of "fit" for students and books. Betts[4] has shown, however, that the grade equivalent scores of various standardized tests designated by their publishers as fifth grade level, did not

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[2]Ibid., pp. 6 and 8.

[3]Ibid., p.10.

[4]Emmett A. Betts, "Foundations of Reading Instruction." New York: American Book, 1957.

adequately determine the achievement level of pupils at the upper and lower ends of the distribution. Chall[5] pointed out this same weakness in the use of standardized achievement tests. Killgallon[6] also found that standardized tests did not discriminate well among the lower extremes of the distribution.

Because of the inadequacies of standardized tests the IRI could become a much more useful instrument. At present, however, we face several problems in its use. These are as follows:

Was the original criteria (percentage of words and questions missed) based on empirical evidence of a nature that would enable the teacher or researcher to place his faith in its use? Kender[7] criticizes Betts' (probably the father of the IRI) criteria for scoring informal reading inventories. He states:

> A case in point is Killgallon's study upon which at least a part of Betts' criteria for scoring informal reading tests is based. As one aspect of a larger investigation, Killgallon examined 41 fourth grade pupils on an informal reading test in an effort to establish criteria for scoring any such instrument of similar construction. Peculiarly enough, he set up a priori criteria for the establishment of instructional levels, then tested his subjects, analyzed the performance of the subjects at the instructional level on the basis of his a priori criteria, and derived a new set of criteria. He found, for example, that the most suitable percentage of accuracy for acceptable pronunciation at the instructional level was 95 per cent. Despite the unorthodox manner by which this 'criterion score' was derived, it is quoted widely in the literature.

Another major problem we face in using informal reading inventories is the lack of agreement in their scoring. Kress and Johnson,[8] for example, suggest that the following be counted as reading errors in oral reading: "...substitutions, insertions, omissions, and requests for examiner aid." On the other hand, in the teacher's manual

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[5]Jeanne S. Chall, "Interpretation of Results of Standardized Reading Tests," EVALUATION OF READING. Supplementary Educational Monographs, No. 88. Chicago: University of Chicago Press, 1958, pp. 133-138.

[6]Patsy A. Killgallon, "A Study of Relationships Among Certain Pupil Adjustments in Language Situations," Unpublished Doctoral Dissertation, Pennsylvania State College, 1942.

[7]Joseph P. Kender, "How Useful Are Informal Reading Tests?" THE JOURNAL OF READING, Vol. II, No. 5, February, 1968, pp. 337-41.

[8]Op. cit., p. 38.

of a test written by Silvaroli[9] entitled CLASSROOM READING INVENTORY, the author states, "The child makes a word recognition error when he repeats, substitutes, omits or needs teacher assistance in pronouncing words." Both Kress and Johnson, and Silvaroli use the same percentages of words and questions missed to place a student at his free, instructional, or frustration reading levels. However, the fact that Silvaroli used repetitions in addition to the other mistakes makes it obvious that different results will be obtained, depending upon which author's criteria is used.

In discussing the lack of agreement in scoring informal reading inventories Kender[10] states:

> When one analyzes the criteria used to score informal reading tests, there is even more conflicting data. There is disagreement, for example, over whether or not to include certain types of errors such as repetitions when calculating percentages of accuracy in oral reading. There is disagreement over whether all oral reading errors should be counted or whether only significant errors, that is, those that alter the meaning of the sentence or passage, should be counted. There is disagreement over whether or not vocalizing during silent reading is a detriment to the reader and whether it should be considered in ascertaining instructional levels. Some feel that understanding of 90 per cent of the material is necessary at the instructional level; others feel that 75 per cent is adequate; while others contend that only 60 per cent is sufficient--and on it goes. Perhaps some of the disagreement results from the dearth of research related to the subject. This writer found only three experimental studies devoted to the topic, and these have obvious shortcomings.

A third problem area in using informal reading inventories is that we do not know whether the free, instructional and frustration reading levels are the same for any two students. For example, we do not know whether younger students frustrate sooner (in terms of percentage of words and questions missed) than older students or vice versa, or whether the same criteria could be applied to all students. The same question also exists for other factors such as intelligence, sex, ethnic background, general reading level, and personality type.

The polygraph, or cardio-sphygmo-pneumogalvo-graph, is a pneumatically operated mechanical recorder of changes in blood pressure, pulse rate, and respiration rate. In addition, this device is

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[9]Nicholas J. Silvaroli, "Classroom Reading Inventory," Teacher's Manual. Dubuque, Iowa: William C. Brown, 1969, p. XIV.

[10]Op. cit., pp. 338 and 339.

supplemented with a unit for recording electrodermal responses. The functions of the polygraph are to indicate whether or not a person is truthful, deceitful, or anxious.[11] Anxiety can be defined as an unpleasant emotional state or a reaction toward a present and strong desire or drive that seems likely to miss its goal.[12] Considerable research was done and no information was found relative to using the polygraph to obtain the information such as is described in this study. For this reason a meeting was held with all of the consultants listed. All agreed to participate, and all agreed that it was a unique and feasable research project. Dr. Niel R. Burch (an M.D.) who is Head of the Department of Psychophysiology at Baylor University College of Medicine was also contacted. Dr. Burch is a leading authority on the use of, and research using the polygraph. He also expressed enthusiasm with this project.

Statement of Objectives. The scope of this research project was as follows:

A. As the student reads progressively more difficult passages, he was tested or monitored by the polygraph to determine whether he was inwardly exhibiting frustration that was not outwardly visible. As a result of this, perhaps new criteria will have to be established for the various levels, especially the frustration level.

B. Determine whether students at various intelligence levels exhibit different frustration levels. As a result of this testing it might be determined that one cannot generalize about frustration levels of students as a whole, but that we must know the intelligence level of a student before applying any one set of criteria to his frustration level.

C. Determine whether students at various grade levels exhibit varying frustration levels.

D. Determine whether students of different sex have different frustration reading levels.

E. Determine whether students with various personality characteristics have varying frustration reading levels.

F. Determine whether students from various ethnic backgrounds have varying frustration reading levels. (Anglo-American, Mexican-American, and Negro-American).

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[11]John E. Reid and Fred E. Inban, TRUTH AND DECEPTION: THE POLYGRAPH ("LIE DETECTOR") TECHNIQUE. Baltimore: The Williams and Wilkins Co., 1966, p.4.

[12]Horace B. English and Ava Champney English, A COMPREHENSIVE DICTIONARY OF PSYCHOLOGICAL AND PSYCHOANALYTICAL TERMS. New York: Longmans, Green and Co., Inc., 1958, p. 284

G. Determine whether students reading below, at, or above grade level will exhibit varying frustration reading levels. (Students who were reading below grade level would, of course, be more likely to become frustrated at a certain grade level than those reading at, or above grade level. The research here deals with the total per cent of words and/or questions missed when the student shows signs of frustration.)

H. Determine whether students of various grade levels exhibit varying frustration levels.

I. Determine whether the use of repetitions as errors results in a different frustration level from the commonly accepted criteria.

The following null hypotheses were tested with the .05 level of confidence being required to reject H_o:

H_{o1} There will be no significant difference between the polygraph-measured frustration reading level on oral errors and the commonly accepted criteria of 10 or more errors in 100 words.

H_{o2} There will be no significant difference between the polygraph-measured frustration reading level on comprehension and the commonly accepted criteria of one or more errors in four questions.

H_{o3} There will be no significant difference between the polygraph-measured frustration reading levels of the group with intelligence levels one SD above the mean and the group with intelligence levels one SD below the mean. (WISC Full Scale IQs)

H_{o4} There will be no significant difference between the polygraph-measured frustration reading levels of the group with intelligence levels one SD above the mean and the group with intelligence levels less than one SD above or below the mean. (WISC Full Scale IQs)

H_{o5} There will be no significant difference between the polygraph-measured frustration reading levels of the group with intelligence levels one SD below the mean and the group with intelligence levels less than one SD above or below the mean. (WISC Full Scale IQs)

H_{o6} There will be no significant difference between the polygraph-measured frustration reading levels of the Anglo-American group and the Mexican-American group.

H_{o7} There will be no significant difference between the polygraph-measured frustration reading levels of the Anglo-American group and the Negro-American group.

H_{o8} There will be no significant difference between the polygraph-measured frustration reading levels of the Mexican-American group and the Negro-American group.

H_{o9} There will be no significant difference between the polygraph-measured frustration reading levels of the group reading one year above grade level and the group reading one year below grade level.

H_{o10} There will be no significant difference between the polygraph-measured frustration reading levels of the group reading one year above grade level and the group reading at less than one year above or below grade level.

H_{o11} There will be no significant difference between the polygraph-measured frustration reading levels of the group reading one year below grade level and the group reading at less than one year above or below grade level.

H_{o12} There will be no significant difference between the polygraph-measured frustration reading levels of the group of third graders and the group of fifth graders.

H_{o13} There will be no significant difference between the polygraph-measured frustration reading levels of the group of third graders and the group of fourth graders.

H_{o14} There will be no significant difference between the polygraph-measured frustration reading levels of the group fourth graders and the group of fifth graders.

H_{o15} There will be no significant difference between the polygraph-measured frustration reading levels of the group of boys and the group of girls.

After all psychological tests had been administered and scored, students were classified according to certain personality characteristics. On the basis of these categories the following additional hypotheses were developed:

H_{o16} There will be no significant difference between the polygraph-measured frustration reading levels of the low intelligence level group and the high intelligence level group.

H_{o17} There will be no significant difference between the polygraph-measured frustration reading levels of the high intelligence level group and the moderate intelligence level group.

H_{o18} There will be no significant difference between the polygraph-measured frustration reading levels of the moderate intelligence level group and the low intelligence level group.

H_{o19} There will be no significant difference between the polygraph-measured frustration reading levels of the group with impulsive cognitive style and the group with systematic cognitive style.

H_{o20} There will be no significant difference between the polygraph-measured frustration reading levels of the group with systematic cognitive style and the group with mixed cognitive style.

H_{o21} There will be no significant difference between the polygraph-measured frustration reading levels of the group with mixed cognitive style and the group with impulsive cognitive style.

H_{o22} There will be no significant difference between the polygraph-measured frustration reading levels of the group with restricted perceptual acuity and the group with expansive perceptual acuity.

H_{o23} There will be no significant difference between the polygraph-measured frustration reading levels of the group with expansive perceptual acuity and the group with mixed perceptual acuity.

H_{o24} There will be no significant difference between polygraph-measured frustration reading levels of the group with mixed perceptual acuity and the group with restricted perceptual acuity.

H_{o25} There will be no significant difference betweeen the polygraph-measured frustration reading levels of the group with uncontrollable emotions and the group with highly controllable emotions.

H_{o26} There will be no significant difference between the polygraph-measured frustration reading levels of the group with highly controllable emotions and the group with controllable emotions.

H_{o27} There will be no significant difference between the polygraph-measured frustration reading levels of the group with controllable emotions and the group with uncontrollable emotions.

H_{o28} There will be no significant difference between the polygraph-measured frustration reading levels of the group that is coldly unemotional and the group that is highly sensuous.

H_{o29} There will be no significant difference between the polygraph-measured frustration reading levels of the group that is highly sensuous and the group that moderately enjoys emotions.

H_{o30} There will be no significant difference between the polygraph-measured frustration reading levels of the group that moderately enjoys emotions and the group that is coldly unemotional.

METHODS

Subjects. An elementary school in the El Paso area was chosen as the school to participate in the project because it contained the best cross sectioning of Mexican-American, Anglo-American, and Negro-American students with similar socio-economic backgrounds. The researchers made a preliminary selection of 50 third grade students, 50 fourth grade students, and 50 fifth grade students based on information obtained from cumulative records. This selection insured as far as possible a representative sampling of the following: intelligence, reading level, sex, ethnic background, and personality type. Letters signed by the principal of the school were sent home with the 150 students(of which 62 were contacted)explaining briefly the intent of the project and asking for convenient time(s) for researchers to visit the homes of the students. Each parent was contacted personally and given a thorough explanation of the purpose of the testing. Parents were asked to give their written permission for the testing. A previously prepared form for permission was used. Parents were assured that students were not to be given a "Lie Detector Test," but that the polygraph would only be used to monitor their reading.

Further investigation of the 150 children revealed that some students were classified as Anglo-American when, in fact, they had Anglo-American fathers and Mexican-American mothers who, in some cases, did not speak English. The researchers did not feel that this was a true representation of Anglo-American cultural background; therefore, it was necessary to select some Anglo-Americans from two nearby schools whose students have similar socio-economic backgrounds.

The testing was done with 62 students in grades three, four, and five with twenty students from each of the three grade levels. One-third of the students were Anglo-American, one-third Mexican-American, and one-third were Negro-American. A general cross section of readers were used, based on information in the cumulative records, so as not to obtain only good, medium, or retarded readers.

Procedure. Each child was tested individually. The testing extended over a period of approximately one semester (First Semester of the 1970-71 Academic Year). Approximately 2-1/2 hours of time was required to test each student. The procedures for the polygraph-reading test and the psychological tests are as follows:
Polygraph-Reading Test. Spache's[13] Diagnostic Reading Scales were used as the informal reading inventory. These contain a series of graded reading passages (at least two at each grade level) from readability levels of 1.6 to 8.5. There is also a series of comprehension questions over each reading passage.

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[13]George Spache, Diagnostic Reading Scales, Monterrey, Calif.: California Test Bureau, 1963.

In order to be consistent in marking oral reading errors, the following oral errors were counted: omissions (unless corrected), insertions (once made cannot be corrected), substitutions, partial and gross mispronunciations, and requests for examiner aid. Although Kress and Johnson[14] and Silvaroli[15] do not list partial and gross mispronunciations as errors, the researchers in this case believe that they considered both partial and gross mispronunciations as substitutions. Repetitions were also marked, and the number of errors counting repetitions and not counting repetitions was recorded.

As the informal reading inventory was administered to each child individually, the child was also being monitored by the polygraph. Researchers practiced coordinating the testing techniques of the polygraph examination with those of the informal reading inventory, thus making the monitoring of reading by the use of the polygraph more facile. The recording units attached to the child's body were the breathing unit, the galvanic skin response unit, and the plethysmograph unit. The actual recording of the three units is made on chart paper which is driven by an electric motor at a constant speed of 6 inches per minute. Each child was begun at an easy enough passage so that the polygraph indicated normal readings (exceptions are two third grade girls who were frustrated at the first grade) and were allowed to read until the polygraph indicated frustration. The polygraph expert and a neurologist then interpreted each polygraph test to indicate the point of apparent frustration as the students progressed through the reading passages. Tracings were graded individually by comparing the pre-set norm against the frustration level, which was determined by magnitude of changes in amplitude, baseline, rate and rises. At the frustration reading level stipulated by the polygraph examiner, the percentage of oral errors and comprehension errors were computed. Using the criteria mentioned on page 2, the informal reading inventory of each child was scored, and an Independent Reading Level, an Instructional Reading Level, and a Frustration Reading Level for both word recognition (oral reading) and comprehension were established. These scores were used as the bases for designating reading grade placement (H_{o9},H_{o10},H_{o11}).

Students' reading of the informal reading inventory passages were recorded on tape. These were played back and checked several times to insure that all oral reading errors were correctly recorded. Students' answers to the comprehension questions were also analyzed in this manner.

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[14] Op. cit.

[15] Op. cit.

Psychological Tests.

Each child was given the Wechsler Intelligence Scale for Children, the House-Tree-Person Test, and the Rorschach Test. The WISC and Rorschach Tests were administered on separate days. On the basis of the WISC, three intelligence levels were established - one standard deviation above the mean, one standard deviation below the mean, and less than one standard deviation above or below the mean. Based on the interpretation of the House-Tree-Person and Rorschach Tests, the following personality groups were identified among the students:

Intellectual Ability	Low	Moderate	High
Cognitive Style	Impulsive	Mixed	Systematic
Perceptual Acuity	Restricted	Mixed	Expansive
Emotional Control	Uncontrolled	Controllable	Highly Controlled
Affective Gratification	Coldly Unemotional	Moderately enjoys his emotions	Highly Sensuous

Treatment of the Data.

The averages of oral errors and comprehension errors at the polygraph-measured frustration reading level were computed and by use of the z test, it was determined if these averages were significantly different from the 10% and the 50% commonly accepted criteria. (The lower limit for frustration is usually considered to be 90% or less on word recognition and 50% or less on comprehension. This, of course, refers to the minimum correct percent of word recognition and comprehension. The 10% word recognition and 50% comprehension mentioned here refers to the percent that is incorrect.)

Six major categories were considered: intelligence level, ethnic background, reading level, grade level, sex, and personality type. These categories were further subdivided into three subgroups each (except sex) and the polygraph-measured frustration means (word recognition and comprehension) of the subgroups were compared. The t test was used to determine if the differences were significant at the .05 and .01 levels of confidence.

The above procedure was repeated three times, once counting repetitions as errors, once not counting repetitions as errors, and once for comprehension errors.

RESULTS

Each hypothesis was tested, where applicable, using the following scores based on the number of errors the child made, both in oral reading and comprehension, at the point which the polygraph examiner designated as frustration: (1) number of errors counting repetitions (2) number of errors not counting repetitions (3) comprehension errors. All were accepted or rejected at the .05 level of confidence.

Originally there were only fifteen hypotheses plus an unknow additional number based on the psychologists' assessments of personality types. After the pschologists analyzed the data, the number of hypotheses was expanded to thirty on the basis of their categorization of personality types.

H_{o1} There will be no significant difference between the polygraph-measured frustration reading level on oral errors and the commonly accepted criteria of 10 or more errors in 100 words.

Hypothesis #1 was rejected when not counting repetitions as errors; that is, there was a significant difference between the polygraph-measured frustration level on oral errors and the criteria of 10 percent errors (90% correct) at the .05 level of confidence. Hypothesis #1 was accepted when repetitions were counted as errors; that is, there was no significant difference between the polygraph-measured frustration level on oral errors and the criteria of 10 percent errors at the .05 level of confidence. (See Table I)

Table I

Comparison of Polygraph-Measured Frustration (Oral Errors) and Commonly Accepted Criteria of 10% Errors (90% correct) N=62

	Oral Errors (%)	
	w/o Repetitions	With Repetitions
Standard Deviation	7.30	7.81
Mean	7.65	8.90
z score	2.52*	1.10

*significant at .05 level
**significant at .01 level

H_{o2} There will be no significant difference between the polygraph-measured frustration reading level on comprehension and the commonly accepted criteria of 2 or more errors in four questions.

Hypothesis #2 was rejected both at the .05 and .01 levels of confidence. There was a significant difference at these levels between polygraph-measured frustration comprehension scores and the commonly accepted 50% or less correct (2 or more errors in 4 questions) (See Table II)

Table II

Comparison of Polygraph-Measured Frustration (Comprehension Errors) and Commonly Accepted Criteria of 50% Errors (N=62)

	Comprehension Errors (%)
Standard Deviation	21.64
Mean	58.39
z score	3.03**

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o3} There will be no significant difference between polygraph-measured frustration reading levels of the group with intelligence levels one SD above the mean and the group with intelligence levels one SD below the mean.

For oral errors, hypothesis #3 was rejected at the .05 level of confidence both with repetition counted as errors and with repetitions not counted as errors. Hypothesis #3 was accepted when group comprehension scores were compared. (See Table III)

Table III

Comparison of the Polygraph-Measured Frustration Reading Levels of Group With Intelligence One SD Below the Mean (Group A) and Group With Intelligence One SD Above the Mean (Group B)

	Group A N=5			Group B N=5		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	11.46	12.31	15.56	5.18	5.95	30.34
Mean	22.40	23.00	55.80	5.00	5.40	55.20
t score	2.766*	2.574*	.035	2.766*	2.574*	.035

*significant at the .05 level of confidence
**significant at the .01 level of confidence

H_{o4} There will be no significant difference between the polygraph-measured frustration reading levels of the group with intelligence levels one SD above the mean and the group with intelligence levels less than one SD above or below the mean.

Hypothesis #4 was accepted for both oral errors and comprehension errors. (See Table IV)

Table IV

Comparison of the Polygraph-Measured Frustration Reading Levels of Group With Intelligence One SD Above the Mean (Group A) and the Group With Intelligence Less Than One SD Above and Below the Mean (Group B)

	Group A N=5			Group B N=52		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	5.18	5.95	30.34	5.04	5.78	21.09
Mean	5.00	5.40	55.20	6.48	7.88	58.94
t score	.615	.899	.356	.615	.899	.356

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o5} There will be no significant difference between the polygraph-measured frustration reading levels of the group with intelligence levels one SD below the mean and the group with intelligence levels less than one SD above or below the mean.

For oral errors, hypothesis #5 was rejected at both the .05 and .01 levels of confidence both with repetitions counted as errors and with repetitions not counted as errors. Hypothesis #5 was accepted when group comprehension scores were compared. (See Table V)

Table V

Comparison of the Polygraph-Measured Frustration Reading Levels of Group With Intelligence One SD Below the Mean (Group A) and the Group With Intelligence Less Than One SD Above or Below the Mean (Group B)

	Group A N=5			Group B N=52		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	11.46	12.31	15.56	5.04	5.78	21.09
Mean	22.40	23.00	55.80	6.48	7.88	58.94
t score	5.669**	4.791**	.319	5.669**	4.791**	.319

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o6} There will be no significant difference between the polygraph-measured frustration reading levels of the Anglo-American group and the Mexican-American group.

Hypothesis #6 was accepted for both oral errors and comprehension errors. (See Table VI)

Table VI

Comparison of Polygraph-Measured Frustration Reading Levels of Anglo-Americans (Group A) and Mexican-Americans (Group B)

	Group A N=18			Group B N=23		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	5.49	6.48	21.05	9.98	10.43	19.08
Mean	6.94	8.67	58.39	8.30	9.17	59.74
t score	.507	.176	.210	.507	.176	.210

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o7} There will be no significant difference between the polygraph-measured frustration reading levels of the Anglo-American group and the Negro-American group.

Hypothesis #7 was accepted both for oral errors and comprehension errors. (See Table VII)

Table VII

Comparison of Polygraph-Measured Frustration Reading Levels of Anglo-Americans (Group A) and Negro-Americans (Group B)

	Group A N=18			Group B N=21		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	5.49	6.48	21.05	4.65	4.99	24.50
Mean	6.94	8.67	58.39	7.52	8.81	56.90
t score	.348	.076	.196	.348	.076	.196

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o8} There will be no significant difference between the polygraph-measured frustration reading levels of the Mexican-American group and the Negro-American group.

Hypothesis #8 was accepted both for oral errors and for comprehension errors. (See Table VIII)

Table VIII

Comparison of Polygraph-Measured Frustration Reading Levels of Mexican-Americans (Group A) Negro-Americans (Group B)

	Group A N=23			Group B N=21		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	9.98	10.43	19.08	4.65	4.99	24.50
Mean	8.30	9.17	59.74	7.52	8.81	56.90
t score	.320	.142	.420	.320	.142	.420

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o9} There will be no significant difference between the polygraph-measured frustration reading levels of the group reading one year below grade level and the group reading one year above grade level.

For oral errors hypothesis #9 was rejected at both the .05 and .01 levels of confidence both with repetitions counted as errors and with repetitions not counted as errors. Hypothesis #9 was rejected at the .05 level when group comprehension scores were compared. (See Table IX)

Table IX

Comparison of Polygraph-Measured Frustration Reading Levels of Group Reading One Year Above Grade Level (Group A) and Group Reading One Year Below Grade Level (Group B)

	Group A N=19			Group B N=28		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	2.43	2.61	23.41	8.65	9.26	18.47
Mean	2.58	3.21	51.16	10.79	12.29	64.68
t score	3.942**	4.071**	2.160*	3.942**	4.071**	2.160*

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o10} There will be no significant difference between the polygraph-measured frustration reading levels of the group reading one year above grade level and the group reading at less than one year above and below grade level.

For oral errors hypothesis #10 was rejected at both the .05 and .01 levels of confidence both when repetitions were counted as errors and when repetitions were not counted as errors. Hypothesis #10 was accepted for comprehension. (See Table X)

Table X

Comparison of Polygraph-Measured Frustration Reading Levels of Group Reading One Year Above Grade Level (Group A) and the Group Reading Less Than One Year Above or Below Grade Level (Group B)

	Group A N=19			Group B N=15		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	2.43	2.61	23.41	4.69	4.50	21.40
Mean	2.58	3.21	51.16	8.20	9.80	55.80
t score	4.374**	5.183**	.578	4.374**	5.183**	.578

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o11} There will be no significant difference between the polygraph-measured frustration reading levels of the group reading one year below grade level and the group reading at less than one year above or below grade level.

Hypothesis #11 was accepted for both oral errors and comprehension errors. (See Table XI)

Table XI

Comparison of Polygraph-Measured Frustration Reading Levels of the Group Reading One Year Below Grade Level (Group A) and Group Reading Less Than One Year Above or Below Grade Level (Group B)

	Group A N=28			Group B N=15		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	8.65	9.26	18.47	4.69	4.50	21.40
Mean	10.79	12.29	64.68	8.20	9.80	55.80
t score	1.051	.956	1.386	1.051	.956	1.386

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o12} There will be no significant difference between the polygraph-measured frustration reading levels of the group of third graders and the group of fifth graders.

Hypothesis #12 was accepted for both oral errors and comprehension errors. (See Table XII)

Table XII

Comparison of Polygraph-Measured Frustration Reading Levels of Third Graders (Group A) and Fifth Graders (Group B)

	Group A N=22			Group B N=20		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	9.66	9.84	24.75	5.73	6.43	22.43
Mean	9.68	10.68	52.50	6.25	7.45	62.95
t score	1.349	1.216	1.394	1.349	1.216	1.394

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o13} There will be no significant difference between the polygraph-measured frustration reading levels of the group of the group of third graders and the group of fourth graders.

Hypothesis #13 was accepted for both oral errors and comprehension errors. (See Table XIII)

Table XIII

Comparison of Polygraph-Measured Frustration Reading Levels of Third Graders (Group A) and Fourth Graders (Group B)

	Group A N=22			Group B N=20		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	9.66	9.84	24.75	4.75	5.95	14.58
Mean	9.68	10.68	52.50	6.80	8.40	60.30
t score	1.179	.877	1.199	1.179	.877	1.199

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o14} There will be no significant difference between the polygraph-measured frustration reading levels of the group of fourth graders and the group of fifth graders.

Hypothesis #14 was accepted both for oral errors and for comprehension errors. (See Table XIV)

Table XIV

Comparison of Polygraph-Measured Frustration Reading Levels of Fourth Graders (Group A) and Fifth Graders (Group B)

	Group A N=22			Group B N=20		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	4.75	5.95	14.58	5.73	6.43	22.43
Mean	6.80	8.40	60.30	6.25	7.45	62.95
t score	.322	.473	.432	.322	.473	.435

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o15} There will be no significant difference between the polygraph-measured frustration reading levels of the group of boys and the group of girls.

Hypothesis #15 was accepted for both oral errors and comprehension errors. (See Table XV)

Table XV

Comparison of Polygraph-Measured Frustration Reading Levels for Boys (Group A) and Girls (Group B)

	Group A N=32			Group B N=30		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	4.88	5.90	18.77	9.04	9.35	24.27
Mean	6.47	8.03	59.56	8.90	9.83	57.13
t score	1.307	.899	.435	1.307	.897	.435

*significant at .05 level of confidence
**significant at .01 level of confidence

The following hypotheses are based on psychologists' assessments of personality types and intelligence levels using the Rorsharch and House-Tree-Person Tests.

H_{o16} There will be no significant difference between the polygraph-measured frustration reading levels of the low intelligence level group and the high intelligence level group.

Hypothesis #16 was rejected for oral errors both when repetitions were counted as errors and when repetitions were not counted as errors. It was accepted for comprehension errors. (See Table XVI)

Table XVI

Comparison of Polygraph-Measured Frustration Reading Levels of Low Intelligence Level Group (Group A) and High Intelligence Level Group (Group B)

	Group A N=8			Group B N=13		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	11.96	12.21	19.08	4.16	4.65	24.25
Mean	16.75	17.63	61.38	5.31	6.15	55.77
t score	3.001**	2.899**	.529	3.011**	2.899**	.529

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o17} There will be no significant difference between the polygraph-measured frustration reading levels of the high intelligence level group and the moderate level intelligence group.

Hypotheis #17 was accepted for both oral errors and comprehension errors. (See Table XVII)

Table XVII

Comparison of Polygraph-Measured Frustration Reading Levels of High Intelligence Level Group (Group A) and Moderate Level Intelligence Group (Group B)

	Group A N=13			Group B N=41		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	4.16	4.65	24.25	5.32	6.20	21.14
Mean	5.31	6.15	55.77	6.61	8.07	58.63
t score	.793	1.009	.403	.793	1.009	.403

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o18} There will be no significant difference between the polygraph-measured frustration reading levels of the moderate intelligence level group and the low intelligence level group.

Hypothesis #18 was rejected for oral errors at both the .05 and .01 level of confidence both when repetitions were counted as errors and when repetitions were not counted as errors. It was accepted for comprehension errors. (See Table XVIII)

Table XVIII

Comparison of Polygraph-Measured Frustration Reading Levels of Moderate Intelligence Level (Group A) and Low Intelligence Level Group (Group B)

	Group A N=41			Group B N=8		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	5.32	6.20	21.14	11.96	12.21	19.08
Mean	6.61	8.07	58.63	16.75	17.63	61.38
t score	3.748**	3.221**	.334	3.748**	3.221**	.334

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o19} There will be no significant difference between the polygraph-measured frustration reading levels of the group with impulsive cognitive style and the group with systematic cognitive style.

Hypothesis #19 was accepted both for oral errors and comprehension errors. (See Table XIX)

Table XIX

Comparison of Polygraph-Measured Frustration Reading Levels of the Group With Impulsive Cognitive Style (Group A) and the Group With Systematic Cognitive Style (Group B)

	Group A N=22			Group B N=10		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	9.86	10.11	24.19	3.50	4.29	23.61
Mean	10.68	11.95	57.59	4.60	5.30	51.40
t score	1.838	1.937	.655	1.838	1.937	.655

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o20} There will be no significant difference between the polygraph-measured frustration reading levels of the group with systematic cognitive style and the group with mixed cognitive style.

Hypothesis #20 was accepted for both oral errors and comprehension errors. (See Table XX)

Table XX

Comparison of Polygraph-Measured Frustration Reading Levels of the Group With Systematic Cognitive Style (Group A) and the Group With Mixed Cognitive Style (Group B)

	Group A N=10			Group B N=30		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	3.50	4.29	23.61	4.79	5.72	18.11
Mean	4.60	5.30	51.40	6.23	7.67	61.30
t score	.969	1.171	1.346	.969	1.171	1.346

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o21} There will be no significant difference between the polygraph-measured frustration reading levels of the group with mixed cognitive style and the group with impulsive cognitive style.

For oral errors, hypothesis #21 was rejected at the .05 level of confidence when repetitions were not counted as errors. When repetitions were counted as errors, the hypothesis was accepted. When comprehension errors were compared, hypothesis #21 was accepted. (See Table XXI)

Table XXI

Comparison of Polygraph-Measured Frustration Reading Levels of the Group With Mixed Cognitive Style (Group A) and the Group With Impulsive Cognitive Style (Group B)

	Group A N=30			Group B N=22		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	4.79	5.72	18.11	9.86	10.11	24.19
Mean	6.23	7.67	61.30	10.68	11.95	57.59
t score	2.109*	1.901	.620	2.109*	1.901	.620

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o22} There will be no significant difference between the polygraph-measured frustration reading levels of the group with restricted perceptual acuity and the group with expansive perceptual acuity.

For oral errors, hypothesis #22 was rejected at the .05 and .01 levels of confidence both when repetitions were counted as errors and when repetitions were not counted as errors. When comprehension errors were compared, hypothesis #22 was accepted. (See Table XXII)

Table XXII

Comparison of Polygraph-Measured Frustration Reading Levels of the Group With Restricted Perceptual Acuity (Group A) and the Group With Expansive Perceptual Acuity (Group B)

	Group A N=8			Group B N=14		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	8.12	7.79	24.27	4.51	5.06	23.79
Mean	15.25	16.13	51.63	5.29	6.00	50.07
t score	3.528**	3.519**	.139	3.528**	3.519**	.139

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o23} There will be no significant difference between polygraph-measured frustration reading levels of the group with expansive perceptual acuity and the group with mixed perceptual acuity.

Hypothesis #23 was accepted for both oral errors and comprehension errors. (See Table XXIII)

Table XXIII

Comparison of Polygraph-Measured Frustration Reading Levels of the Group With Expansive Perceptual Acuity (Group A) and the Group With Mixed Perceptual Acuity (Group B)

	Group A N=14			Group B N=40		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	4.51	5.06	23.79	6.95	7.74	18.94
Mean	5.29	6.00	50.07	6.95	8.47	62.65
t score	.820	1.095	1.958	.820	1.095	1.958

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o24} There will be no significant difference between polygraph-measured frustration reading levels of the group with mixed perceptual acuity and the group with restricted perceptual acuity.

For oral errors, hypothesis #24 was rejected at the .05 and .01 level of confidence when repetitions were not counted as errors; it was rejected at the .05 level of confidence when repetitions were counted as errors. Hypothesis #24 was accepted for comprehension errors. (See Table XXIV)

Table XXIV

Comparison of Polygraph-Measured Frustration Reading Levels of Group With Mixed Perceptual Acuity (Group A) and the Group With Restricted Perceptual Acuity (Group B)

	Group A N=40			Group B N=8		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	6.95	7.74	18.94	8.12	7.79	24.27
Mean	6.95	8.47	62.65	15.25	16.13	51.63
t score	2.930**	2.495*	1.399	2.930**	2.495*	1.399

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o25} There will be no significant difference between polygraph-measured frustration reading levels of the group with uncontrollable emotions and the group with highly controllable emotions.

For oral errors, hypothesis #25 was accepted when repetitions were not counted as errors and rejected at the .05 level of confidence when repetitions were counted as errors. Hypothesis #25 was accepted for comprehension errors. (See Table XXV)

Table XXV

Comparison of Polygraph-Measured Frustration Reading Levels of the Group With Uncontrollable Emotions (Group A) and the Group With Highly Controllable Emotions (Group B)

	Group A N=8			Group B N=9		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	4.82	5.12	22.23	4.85	4.23	18.43
Mean	10.38	11.75	56.38	5.22	6.11	69.89
t score	2.060	2.335*	1.286	2.060	2.335*	1.286

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o26} There will be no significant difference between the polygraph-measured frustration reading levels of the group with highly controllable emotions and the group with controllable emotions.

Hypothesis #26 was accepted for both oral errors and comprehension errors. (See Table XXVI)

Table XXVI

Comparison of Polygraph-Measured Frustration Reading Levels of the Group With Highly Controllable Emotions (Group A) and the Group With Controllable Emotions (Group B)

	Group A N=9			Group B N=45		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	4.85	4.23	18.43	7.88	8.53	21.42
Mean	5.22	6.11	69.89	7.64	8.96	56.44
t score	.872	.958	1.725	.872	.958	1.725

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o27} There will be no significant difference between polygraph-measured frustration reading levels of the group with controllable emotions and the group with uncontrollable emotions.

Hypothesis #27 was accepted for both oral errors and comprehension errors. (See Table XXVII)

Table XXVII

Comparison of Polygraph-Measured Frustration Reading Levels of the Group With Controllable Emotions (Group A) and the Group With Uncontrollable Emotions (Group B)

	Group A N=			Group B N=		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	7.88	8.53	21.42	4.82	5.12	22.23
Mean	7.64	8.96	56.44	10.38	11.75	56.38
t score	.931	.881	.008	.931	.881	.008

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o28} There will be no significant difference between polygraph-measured frustration reading levels of the group that is coldly unemotional and the group that is highly sensuous.

Hypothesis #28 was accepted for both oral errors and comprehension errors. (See Table XXVIII)

Table XXVIII

Comparison of Polygraph-Measured Frustration Reading Levels of Coldly Unemotional Group (Group A) and the Highly Sensuous Group (Group B)

	Group A N=3			Group B N=27		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	1.70	1.89	40.42	7.94	8.51	19.90
Mean	2.67	3.67	49.67	9.48	10.74	56.70
t score	1.433	1.387	.490	1.433	1.387	.490

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o29} There will be no significant difference in the polygraph-measured frustration reading levels of the group that is highly sensuous and the group that moderately enjoys emotions.

Hypothesis #29 was accepted for both oral errors and comprehension errors. (See Table XXIX)

Table XXIX

Comparison of Polygraph-Measured Frustration Reading Levels of the Group That is Highly Sensuous (Group A) and the Group That Moderately Enjoys Emotions (Group B)

	Group A N=27			Group B N=32		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	7.94	8.51	19.90	6.70	7.21	20.29
Mean	9.48	10.74	56.70	6.69	8.00	61.00
t score	1.441	1.316	.803	1.441	1.316	.803

*significant at .05 level of confidence
**significant at .01 level of confidence

H_{o30} There will be no significant difference between polygraph-measured Frustration reading levels of the group that moderately enjoys emotions and the group that is coldly unemotional.

Hypothesis #30 was accepted both for oral errors and comprehension errors. (See Table XXX)

Table XXX

Comparison of Polygraph-Measured Frustration Reading Levels of the Group That Moderately Enjoys Emotions (Group A) and the Group That is Coldly Unemotional (Group B)

	Group A N=32			Group B N=3		
	Oral Errors (%)		Comprehension Errors (%)	Oral Errors (%)		Comprehension Errors (%)
	w/o rep.	with rep.		w/o rep.	with rep.	
Standard Dev.	6.70	7.21	20.29	1.70	1.89	40.42
Mean	6.69	8.00	61.00	2.67	3.67	49.67
t score	1.006	1.008	.802	1.006	1.008	.802

*significant at .05 level of confidence
**significant at .01 level of confidence

CONCLUSIONS

Normally, there are two points taken into consideration in measuring oral frustration reading level--below 95%, or below instructional level, and at 90% or less, where the student is always considered to be at the frustration level. In other words, there is really a "no-man's land" in an informal reading inventory (between 91% and 94%). If the student's score falls in this area, he may be considered to be reading at either frustration or instructional level, depending on his comprehension performance. For the purpose of this study the lower limit or 90% (10% errors) value was used--the point which is always considered frustration.

The total group (in hypothesis #1) showed a mean score of 7.65% when repetitions were not counted as errors, which is significantly different from the 10% criteria. When repetitions were counted as errors the mean score was 8.90%, which is not significantly different from the 10% criteria. It would appear that if we continue to use the commonly accepted 10% criteria (90% or less correct) set up from the original research, then repetitions should be counted as errors in order to more nearly approach the original 10% criteria. Counting repetitions would more likely insure that a teacher would not ask a child to read material at his frustration level.

Normally there are two points taken into consideration in measuring comprehension frustration reading level--below 75%, or below instructional level, and at 50% or less, where the student is always considered to be at frustration. Again, there is really a "no man's land" (between 51%-74%). If the student's score falls in this area, he may be considered to be reading at either his frustration or instructional reading level depending on his oral performance. The total group's comprehension mean score (in hypothesis #2) was 58.39% errors (42% correct). Therefore, it would appear that using the lower limits of 50% or less would be a better representation of frustration rather than the use of 51%-74% criteria.

The groups in hypotheses #3, #4, and #5 were based on the full scale score of the Wechsler Intelligence Scale for Children. Since the group with an intelligence level one standard deviation above the mean (above 115 I.Q.) consisted of only five, and the group with intelligence level one standard deviation below the mean (below 85 I.Q.) consisted of only five, any conclusions based on these hypotheses should be qualified. However, it would appear that since the number of oral errors of the group with intelligence level one standard deviation below the mean differed significantly from the number of oral errors of both the group with intelligence level one standard deviation above the mean and the group with intelligence level less than one standard deviation above or below the mean (Means counting repetitions were 33.00%, 5.40%, 7.86% respectively and 22.40%, 5.00%, 6.48% not counting repetitions), it would appear that children of low intelligence can make more errors than children of high or moderate intelligence without becoming frustrated. Therefore, a child of low intelligence

may be able to read and make more oral errors than the accepted criteria without becoming frustrated.

The only significant difference for comprehension errors was found (hypothesis #9) between the group reading one year above grade level and the group reading one year below grade level (Means were 51.16% and 64.68% respectively). It would appear that because good readers are used to being more successful than poor readers, they frustrate more easily. It should be noted that this percentage difference in terms of the number of comprehension questions asked on an informal reading inventory (often 8 questions) would be the difference of missing only one question. Therefore, if the child is a good reader, the teacher might consider him at frustration level one question sooner than the number of questions required for a poor reader to reach frustration level. The group reading one year above grade level differed significantly from both the group reading one year below grade level and the group reading less than one year above or below grade level on oral errors. (Means counting repetitions were 3.21%, 12.29%, 9.80% respectively and 2.58%, 10.79%, 8.20% not counting repetitions). Again it would appear that good readers frustrate more easily than poor or average readers.

The oral error and comprehension error means between frustration reading levels of third, fourth, fifth graders (hypotheses #12,13, and 14) were not significantly different. Therefore, it would appear that when administering an informal reading inventory in grades three, four, and five, grade level does not need to be considered. Some reading specialists have believed that older students frustrate more easily than younger students. This is perhaps true, but it was not apparent among the groups tested in this research.

There was no significant difference between frustration reading levels of boys and girls (hypothesis #15). Therefore, it would appear that sex need not be considered as a factor when applying the IRI criteria.

The groups in hypotheses #16, #17, and #18 were based on the psychologists' classification of intelligence as judged by the House-Tree-Person and the Rorsharch tests. Since the group with a low intelligence level consisted of only eight, conclusions based on these hypotheses should be qualified. However, it would appear that the same conclusion can be reached for these hypotheses as was reached for hypotheses #3, #4, and #5; that is, that children of low intelligence can make more errors than children of high or moderate intelligence without becoming frustrated.

Hypotheses #19, #20, and #21 were based on the psychologists' categories of Systematic Cognitive Style, Mixed Cognitive Style, and Impulsive Cognitive Style. The only significant difference in frustration reading levels was between the oral error scores (not counting repetitions) of the group with impulsive cognitive style and the group with mixed cognitive style. (Means were 10.68% and 6.23% respectively.) The psychologist believed that many children of this age group (8,9,10 years old) have an impulsive cognitive style. They are not trying to achieve order in life or control their environment at this stage of development and are not concerned with success. They have probably not had the training to be compulsive and more systematic. Therefore, they do not become frustrated as easily over errors in oral reading as do children who have achieved some degree of stystematic behavior. Perhaps, more important, is the fact that the educational psychologist was able to divide students into groups that were significantly different from each other.

Hypotheses #25, #26, and #27 were based on the psychologists' categorization of the group according to emotional control. When repetitions were counted as errors there was a significant difference between the group with uncontrollable emotions and the group with highly controlled emotions. (Means were 11.75% and 6.11% respectively) Although both groups were small (N=8 and N=9 respectively) and, although the uncontrollable emotion group's mean did not far exceed the 10% criteria, it might still be assumed that children with highly controllable emotions would frustrate easier than those with uncontrollable emotions. Evidently, what children demonstrate as controllable emotions on pschological tests is not the same as lack of frustration as measured by the polygraph.

Hypotheses #28, #29, and #30 were based on the psychologists' categorization of the group according to the manner in which a child achieves affective gratification (coldly unemotional, moderately enjoys emotions, and highly sensous). There was no significant difference among the means of these groups for either oral errors or comprehension errors; therefore, it would appear that this factor is not important in scoring informal reading inventories.

RECOMMENDATIONS

1. There was a significant difference between the commonly accepted criteria of 10% oral errors to reach frustration level and polygraph measured frustration reading level when repetitions were not counted as errors. However, there was no significant difference between the commonly accepted criteria of 10% oral errors to reach frustration level and polygraph measured frustration reading level when repetitions were counted as errors. Therefore, it is recommended that repetitions be considered as errors when scoring an informal reading inventory providing the commonly accepted 10% frustration criteria is used.

2. Teachers often encounter problems in scoring informal reading inventories, especially for children whose comprehension scores fall between 50% and 75%; that is, they do not know whether to classify the score as insturctional or frustration. Since students did not reach polygraph measured frustration level on comprehension until they had made 58.39% errors (42% correct), it would appear that the 50% correct criteria is adequate for comprehension. Further research is recommended to determine whether a definite cut-off point (for example, 50 + (plus) for instructional level versus 50 - (minus) for frustration level might be a more practical approach to scoring informal reading inventories).

3. Because the group with intelligence level one standard deviation below the mean was small, a definite recommendation should be based on further research. However, it is suggested that when scoring informal reading inventories of children whose intelligence levels are known to be low, one might wish to be more lenient (allow a few more oral errors) in designating the child's frustration level.

4. The good readers appeared to frustrate with considerably less oral errors and less comprehension errors than either the average or poor readers. Therefore, when scoring informal reading inventories, it is recommended that for oral errors good readers be considered as reading at frustration level at what might be normally considered instructional level for average and poor readers. For comprehension errors, it is recommended that good readers be considered as reading at frustration one question sooner than what would be considered frustration level for average and poor readers (when using eight questions).

5. There was no significant difference in polygraph measured frustration reading levels of third, fourth, and fifth grade students. However, some reading specialists are of the opinion that younger students can tolerate more errors without becoming frustrated than can older students. Therefore, it is recommended that further similar research be done using children of a lower age-grade level and children of a higher age-grade level.

6. The psychologists were able to classify children on the basis of psychological tests into systematic cognitive style, mixed cognitive style, and impulsive cognitive style. The fact that a significant difference in oral errors was found between the mixed cognitive style group and the impulsive cognitive style group is evidence that children's learning style can be identified. Therefore, it is recommended that comprehensive research be undertaken to develop a system for more easily classifying these styles of learning which might eventually lead to modification of teaching procedures so as to accomodate the learning style of each child.

7. The psychologists were able to classify children on the basis of the psychological tests into restricted perceptual acuity, mixed perceptual acuity, and expansive perceptual acuity. The fact that there was a significant difference in oral errors between restricted perceptual acuity group and expansive perceptual acuity group is evidence that the degree of children's perception can be identified. Therefore, it is recommended that an easily administered and valid instrument be devised to determine what factors in perceptual acuity interfere with or promote reading ability.

8. The psychologists were able to classify children on the basis of psychological tests into uncontrollable emotions, controllable emotions, and highly controllable emotions. The fact that there was a significant difference in oral errors between the uncontrollable group and the highly controllable group is evidence that the amount of emotional control children possess can be identified. Therefore, it is recommended that further research be undertaken to clarify the role of emotional control and its relation to reading.

GLOSSARY

1. Breathing Unit: The breathing is recorded by attaching a pneumograph tube around the subject. The subjects breathing action during questioning is classified as normal or abnormal. The classification of abnormal is generally applied to those patterns that deviate from the norm established for each subject. The amplitude and cyclic rate varies and is regulated by the physiological structure and condition of the person.

2. Free Reading Level: The level at which the child can function adequately without teacher help. Comprehension should average 90% and word recognition should average 99%.

3. Frustration Reading Level: The level at which the child cannot function adequately. The child shows signs of tension and discomfort. Vocalization is often present in silent reading. Comprehension averages 50% or less, and word recognition averages 90% or less.

4. GSR (Galvanic skin response): A hand or finger attachment is used. The amount of resistance encumbered by the current in passing across this bridge of skin is measured. Perspiration is generally believed to be involved. Electric current travels over a wire back to the amplifier. When properly balanced the tracing takes the form of a slightly wavering line across the chart with only minor responses to spoken stimuli.

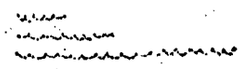
5. Informal Reading Inventory: An IRI consists of a series of graded reading passages usually ranging from pre-primer to grade six or eight. At each level there are two reading passages. One is read orally and one is read silently by the student. As the student reads orally, the testor marks the various word recognition errors made by the student. Following the reading of each passage the testor tests the student's comprehension of the material by asking a series of questions over the subject matter in the reading passage. After the student reads each passage his reading is graded as being at the Independent or Free level, the Instructional level, or the Frustration level.

6. Instructiona' Reading Level: The level at which the child can function adequately with teacher guidance and yet be challenged to stimulate his reading growth. Comprehension should average 75% and word recognition should average 95%.

7. Plethsysmograph: This is a device that records a continuous graph of the pulse rate measured by a pulse sensor assembly which measures the blood volume changes in a subject's finger. Inside the assembly is a light that is sent through the finger and received by a photo-resistor which records the amount of light passing through the finger. The fluctuations in amount of blood determine the strength of the light recording, which is interpreted by electrical impulses.

8. Repetition: In this study a repetition was an error made by the student when he repeated one or more words. Each word(s) repeated a different number of times than other words was considered as an additional repetition. For example, if a wavy line under a word is used to signify a repetition then each different length of line represents a different repetition. However, any one word(s) repeated exactly the same as the first, was only counted as one error. In sentence #1 below there are three errors; however, in sentence #2 there is only one error:

1. The dog chased the cat.



2. The dog chased the cat.