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AUTHOR Hays, Warren S.
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ABSTRACT

The purpose of this study was to determine the relationship between word recognition and comprehension achieved by second and fifth grade students when reading material at various levels of readability. A random sample of twenty-five second and twenty-five fifth graders, taken from three middle class schools, was administered a researcher-developed informal reading inventory (IRI). The IRI was composed of oral and silent reading passages for the readability levels of primer through ninth grade. Subjects, randomly assigned to one of two examiners, began reading at the primer level and continued reading until they had read two consecutive levels where either their word recognition was eighty-five percent or less, or their achieved comprehension was fifty percent or less. Pearson product-moment coefficients of correlation were calculated between word recognition and comprehension, and tested for significance. Chance correlations suggested that no relationship existed between word recognition and comprehension for either group of subjects. (WR)

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Author - Dr. Warren S. Hays

Address - 3218 N. Reno Avenue, Tucson, Arizona 85705

Phone - Home: 887-0682, Office: 884-1311

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Institute Affiliation - Reading Department
University of Arizona

Signature of Author: Warren S. Hays

ABSTRACT

The purpose of this study was to determine the relationship between word recognition and comprehension achieved by second and fifth grade students when reading material at various levels of readability.

The testing instrument used was an Informal Reading Inventory containing levels from primer through ninth grade. A pilot study provided a coefficient of reliability for the word recognition and comprehension questions.

A random sample of twenty-five second and twenty-five fifth graders was taken from three middle-class schools to whom the I.R.I. was administered.

Pearson product-moment coefficients of correlation were calculated between word recognition and comprehension and tested for significance. Chance correlations suggested that no relationship existed between word recognition and comprehension for either group of subjects.

Implications for the classroom teacher are discussed. Also the findings are discussed in relation to Gray's model of reading and suggestions for revision are made and incorporated into a revised model.

The Reading Process
The Relationship Between Word Recognition and Comprehension

THE PROBLEM

Despite considerable research, relatively little is known concerning how individual children learn to read. Recent researchers are in agreement that reading is not composed of one skill, but a large number of interrelated skills that are developed over a period of years. Just exactly what these skills are and how they are interrelated is not known at this time.

To date, the majority of the research that has been conducted concerning reading has been directed towards ascertaining whether one approach tends to produce better results than another. The recent First Grade Studies are an excellent example of that type of research. Although questions have been raised concerning some of the designs of these studies, the results have been helpful in stressing that an ecclectic approach to the teaching of reading is necessary.

At this time, there exists fragments of knowledge concerning the reading process, but not enough information exists to create a comprehensive model of the process. The reasons for this are possibly two-fold -- first, the complexity of the process and second, the limitations of our research instruments. However, these difficulties have not curtailed all research dealing with the process. There is a body of knowledge available much of which is centered around two major aspects - word recognition and comprehension.

Word recognition and its relationship to comprehension has been of interest to reading authorities for some time. However, much of the information has been based upon conventional wisdom rather than research into the reading process. Questions such as these remain unanswered: (1) What is the relationship between word recognition and comprehension for elementary school children? (2) Does this relationship vary according to the readability level of the material? and (3) Does the relationship differ for primary grade children when compared to intermediate grade children?

REVIEW OF THE LITERATURE

In reviewing the literature concerned with the reading process, it becomes increasingly clearer that many disciplines have contributed to our knowledge of the complexities of the task. Clymer stated, "The areas of perception, psychology of learning, linguists, social psychology, and language learning are a few of the fields contributing to an understanding of the reading process and the reading program."(1) From these many contributions, reading authorities have attempted to define the process. It would seem that the task of defining reading would be relatively easy. However, the very complexity of the task makes it improbable that a simple definition could adequately encompass all of the facets.

Upon examination of various definitions of reading, one can readily observe that most tend to over-simplify a very complex task. Just how complicated the process is can be ascertained from Thorndike's work of 1917 when he attempted to demonstrate that reading is akin

to thinking[2]. Gates extended Thorndike's conception of reading when he stated, "It should be developed as a complex organization of the higher mental processes. It can and should embrace all types of thinking, evaluating, judging, imagining, reasoning, and problem-solving."[3]

Another means of defining the reading process has been through the use of models. The creators of models of reading have attempted to set forth in more depth and with greater detail the nature of the reading act. Perhaps one of the most referred to models of reading is the Gray skill model.[4] Gray surmised that an analysis of the available evidence suggested that the understandings, skills, and attitudes common to most reading activities could be classified under four headings: (1) word perception, (2) comprehension, (3) reaction and evaluation, and (4) assimilation.

Robinson, in a thoughtful analysis of Gray's skill model, revised his concept of reading.[6] She retained the four aspects of Gray's model but presented two changes. She incorporated rates of reading and demonstrated the limitless opportunities for development in the four original aspects. She discussed the idea that rate of reading must be flexible and adjusted to the reader's purpose and the nature of the material.

Although this review does not include all of the various theoretical models of reading, Gray and Robinson's models possibly represent the ones referred to most in the literature, and they deal with the two basic skills -- word perception and comprehension which are the subjects of this research.

PROCEDURES OF THE STUDY

The Population

This study was descriptive in nature and designed to investigate the relationships between word recognition and comprehension of second and fifth grade students.

The population available for the main study contained all of the second and fifth grade students in three elementary schools. Those levels were chosen to permit a comparison between primary and intermediate grade children.

For the most part the pupils came from average middle-class homes. The greatest percentage was Anglo (89%); however, there was a comparatively large percentage of Mexican-Americans (8%) and a very small percentage of Negroes (1%), Chinese (-1%) and Papago Indians (1%).

As a part of the school district-wide testing program each student in the elementary schools was given the Stanford Achievement Test during the spring of the school year. The S.R.A. Primary Mental Abilities Test was also administered to first, third, and fifth graders. Table I gives the mean scores achieved by the population on each of these tests. The I.Q. mean score for the second grade was computed from test scores taken during the first year in school.

Types of Reading Programs

Although the population was taken from three different schools, including nine second grade teachers, and ten fifth grade teachers, the reading programs were somewhat similar. The basic program was centered

Table I Population Range and Mean Scores

Grade	No.	Sex B	Sex G	C.A.	I.Q.	Norm	Wrd. Mean. Mean	Wrd. Mean. Range	Par. Mean. Mean	Par. Mean. Range	Wrd. St. Sk. Mean	Wrd. St. Sk. Range
2	253	127	126	7-10	106	2.6	2.6	1.2-6.9	2.5	1.2-6.9	3.0	1.1-7.5
5	302	151	151	11-0	106	5.6	5.4	1.7-9.5	5.4	1.5-11.2	-	-

around a Basal Reader approach which was combined with a Language Experience approach at the first grade level. The latter approach was only continued at the second grade level with students who had difficulty in making normal progress. Fifth grade students had been subjected to several basal reader series none of which had been used continuously over a period of years. Teachers had followed the program outlined in the teacher's manual only when they had felt it necessary. Second grade students had been subjected primarily to one basal series, but others had been used as supplementary material. There was seemingly more continuity and coordination in the second grader's reading program.

Samples

The samples for the study were composed of twenty-five second and twenty-five fifth grade students randomly chosen from the entire second and fifth grade population of the three schools.

The Informal Reading Inventory

An Informal Reading Inventory (I.R.I.) was developed by the investigator containing an oral and silent reading selection for the readability levels -- primer through ninth grade. These selections were carefully selected for the familiarity the students would have with the concepts and for level of readability using the Spache[7] and Dale-Chall[2] formulas. The I.R.I. was then evaluated by two judges both of whom had extensive background in the field of reading. The evaluation was designed to examine the suitability of the selections (interest and common concepts) and the comprehension questions (recall, inference, and

critical evaluation). All necessary revisions were made, and the I.R.I. was administered to five second and five fifth grade students chosen at random from the population. The purposes of the pilot study was to establish a coefficient of reliability and to determine if the selections and questions were appropriate. After three weeks, the I.R.I. was again administered to the same subjects. The coefficient of reliability for the two groups of tests ranged from .943 for word recognition to .990 for comprehension.

Administration and Scoring of the I.R.I.

In order to shorten the time needed to gather the research data and to eliminate researcher bias, two other examiners with extensive background in reading were trained and were utilized in the administration of the Informal Reading Inventory. The subjects were randomly assigned to the examiners, and the administration of the I.R.I. was made as uniformily as possible. All subjects began at the primer level and continued until they had read two consecutive levels where either their word recognition was eighty-five percent or less, or their achieved comprehension was fifty percent or less. This provided a good psychological situation for the subjects and still provided the necessary information sought by the researcher.

The word recognition percentage was computed from the oral selection. Mispronounced words, omitted words, inserted words, words that were reversed such as be to for to be, and words given by the examiner after a ten second delay were considered word recognition errors. However, any of these five types of errors that were co.rected

by the subject and mispronounced words that were considered to be a result of the subjects dialect were not scored as errors.

The comprehension score was computed from the silent selection and all questions were given equal weight. Partial answers were scored accordingly to the amount of correctness. For example, if the question required an answer containing two parts and the subject only gave one the question was scored as being half correct.

In order to make certain the scoring was reliable, all tests were scored by all three examiners and questionable scoring was resolved.

Pearson product-moment coefficients of correlation were computed between word recognition and comprehension for both samples of students. Those correlations were tested for significance. Tests of significance were calculated among the correlations for each sample and between second graders reading second level material and fifth graders reading fifth grade material.

DATA ANALYSIS

The Pearson product-moment coefficients of correlations between word recognition and comprehension for second and fifth graders are shown in Table II.

Correlations for Second Graders

To determine if a relationship existed between word recognition and comprehension, those correlations derived from a sample size of twenty or more were tested for significance. Samples with an N of less than twenty were not tested. Probability levels of .10, .05, .01

Table II Correlations Between Word Recognition and Comprehension for Second and Fifth Grade Students

	P		1		2		3		4		5		6		7		8		9	
Grade	N	r	N	r	N	r	N	r	N	r	N	r	N	r	N	r	N	r	N	r
2	25	-.184	24	.384	25	.451	14	.570	8	.348	6	.319	4	-.904	-		-		-	
5	25	.190	24	-.109	24	.537	21	.223	20	.369	25	.566	15	.280	13	.676	12	.232	10	.625

were reported. However since both the criteria of word recognition and comprehension were rather nebulous concepts in that they possibly consisted of a variety of factors, only the .01 probability was considered as significant. Table III contains those tested correlations for the sample of second graders.

These findings suggested that all of the correlations between word recognition and comprehension for second graders varied from zero by chance at the .01 level of probability.

An examination of the range and the median scores contained in Table IV provided some explanation for the nonsignificant correlations.

As the range of word recognition and comprehension scores increased for the primer through the second level of readability, the relationship between the two criteria became greater. This suggested that the more difficult the readability level of the material the higher the correlation.

Correlations for Fifth Graders

There were two correlations for fifth graders that were significant at the .01 level of probability -- the second and fifth levels of readability. This is shown in Table V.

Here also, an examination of the range, median, and mean scores provided some insight into the possible causes for these correlations. That information is contained in Table VI.

The difference in the range and median scores achieved at the primer and second level of readability suggested that as the material became more difficult there was more variance in the scores resulting in

Table III The Correlations Between Word Recognition and Comprehension for Second Grade Subjects

Level	N	r	P
P	25	-.184	>.10
1	25	.384	<.10
2	25	.451	<.05

Table IV Range, Median, and Mean Scores of Word Recognition and Comprehension for Second Grade Subjects

Level	N	r	W.R.Rng.	Comp.Rng.	W.R. M.	Comp. M.	W.R. $\overline{X}$	Comp. $\overline{X}$
P	25	-.184	88-100	30-100	98.5	61.4	97.7	75.2
1	25	.384	64-100	10-80	93.3	31.4	92.3	44.4
2	25	.451	34-100	0-80	93.8	31.3	83.5	38.6
3	14	.570	82-100	15-70	96.5	40.5	95.9	39.3
4	8	.348	93-100	0-65	95.5	31.5	96.9	46.9
5	6	.319	88-98	20-60	89.5	40.5	94.5	39.2
6	4	.904	92-98	20-55	96.5	30.5	95.6	35.0

Table V The Correlations Between Word Recognition and Comprehension for Fifth Grade Subjects

Level	N	r	P
P	25	.190	> .10
1	24	-.109	> .10
2	24	.537	< .01
3	21	.223	> .10
4	20	.369	> .10
5	25	.566	< .01

Table VI Range, Median and Mean Scores of Word Recognition and Comprehension for Fifth Grade Subjects

Level	N	r	W.R.Rng.	Comp.Rng.	W.R.M.	Comp.M.	W.R. $\bar{X}$	Comp. $\bar{X}$
P	25	.190	94-100	30-100	96.9	71.3	99.1	78.4
1	24	-.109	78-100	10-90	99.6	31.4	98.1	48.8
2	24	.537	68-100	30-100	98.?	60.5	97.6	60.4
3	21	.223	94-100	30-100	98.6	60.9	98.0	61.7
4	20	.369	95-100	20-100	99.2	60.8	98.9	65.0
5	25	.566	25-100	0-90	96.2	45.7	92.3	46.4
6	15	.280	84-100	25-95	96.3	65.7	95.2	64.3
7	13	.676	94-100	25-100	97.7	51.0	97.6	57.7
8	12	.232	93-100	25-65	97.5	45.0	97.3	46.7
9	10	.625	86-100	10-59	93.5	26.5	93.3	31.5

a higher correlation. However, after an examination of scores for the second level, it seemed that one low set of scores could have possibly caused enough variance in the range to produce a significant correlation.

After the second level there was a smaller N, caused by some of the poorer readers being excluded from the testing, and there was less variance in the word recognition scores. This persisted until the fifth level of readability when all subjects were again included in the testing and a statistically significant correlation was achieved. This suggested that the more difficult the material became the greater the relationship was between word recognition and comprehension.

Tests of Difference Among and Between the Correlations

Tests of differences among the correlations between word recognition and comprehension for both second and fifth graders were not computed since all the correlations but two were found to have occurred by chance.

In order to determine if a difference existed between the correlations achieved by second graders reading second level material and fifth graders reading fifth grade material, a t test using the Fisher Z transformation was utilized. A t value of .5174 ($P > .10$) was obtained suggesting that no statistical difference existed at the .01 probability level.

SUMMARY

The original questions that this study was designed to answer were: (1) What is the relationship between word recognition and

comprehension for elementary school children? (2) Does this relationship vary according to the readability level of the material? and (3) Does this relationship differ for primary grade children when compared to intermediate grade children?

Within the limitations of the study the following results, conclusions, and implications were derived.

The Relationship Between Word Recognition and Comprehension

The findings of this study suggested strongly that no significant relationships existed between word recognition and comprehension for second and fifth graders except for fifth graders reading fifth level material. Although other correlations did exist, they were chance relationships.

However, it would be erroneous for one to conclude that the ability to pronounce the words in an article has no bearing upon comprehension. It might be safer to state that success in word recognition does not guarantee success in comprehension for either second or fifth graders. Within the ranges of the two variables that were studied (testing was discontinued when eighty-five percent word recognition and/or fifty percent comprehension was achieved) the level of word recognition seemed to have little impact upon comprehension. However, the significant correlation for fifth graders reading fifth level material did suggest that possibly the more difficult the material became the greater the chance that the relationship would be significant.

This, however, could only be verified by further research using larger samples and having the subjects attempt to read the more difficult levels of readability.

These results do suggest some rather interesting educational implications. For instance, there are those in the field or reading and linguistics who have advocated that reading is primarily a process of decoding written symbols with comprehension taking place automatically. The results and conclusions of this research would certainly tend to cast suspicion on such views since there appears to be no relationship even at the lower levels of readability. It seems as though those reading authorities who have been advocating that to stress decoding skills without equal stress of the comprehension skills would tend to produce verbalizers were correct.

Apparently the child learning to read has to cope with two seperate processes -- word perception and comprehension. Since good word perception skill does not guarantee comprehension, both skills have to be taught within the framework of the reading program and from the very beginning of instruction in the first grade. If one were to examine the two processes, it would be obvious that comprehension is a more complex skill requiring greater mental ability than word recognition. Therefore, it would seem logical that more time and effort should be devoted to the teaching of the various comprehension skills. The classroom practice of having each story read orally to check word recognition and assuming comprehension has taken place is a questionable practice. It is the researcher's opinion that this time could be better

spent in evaluating and teaching those skills that would permit adequate comprehension.

Relationship of Findings to Gray's Model

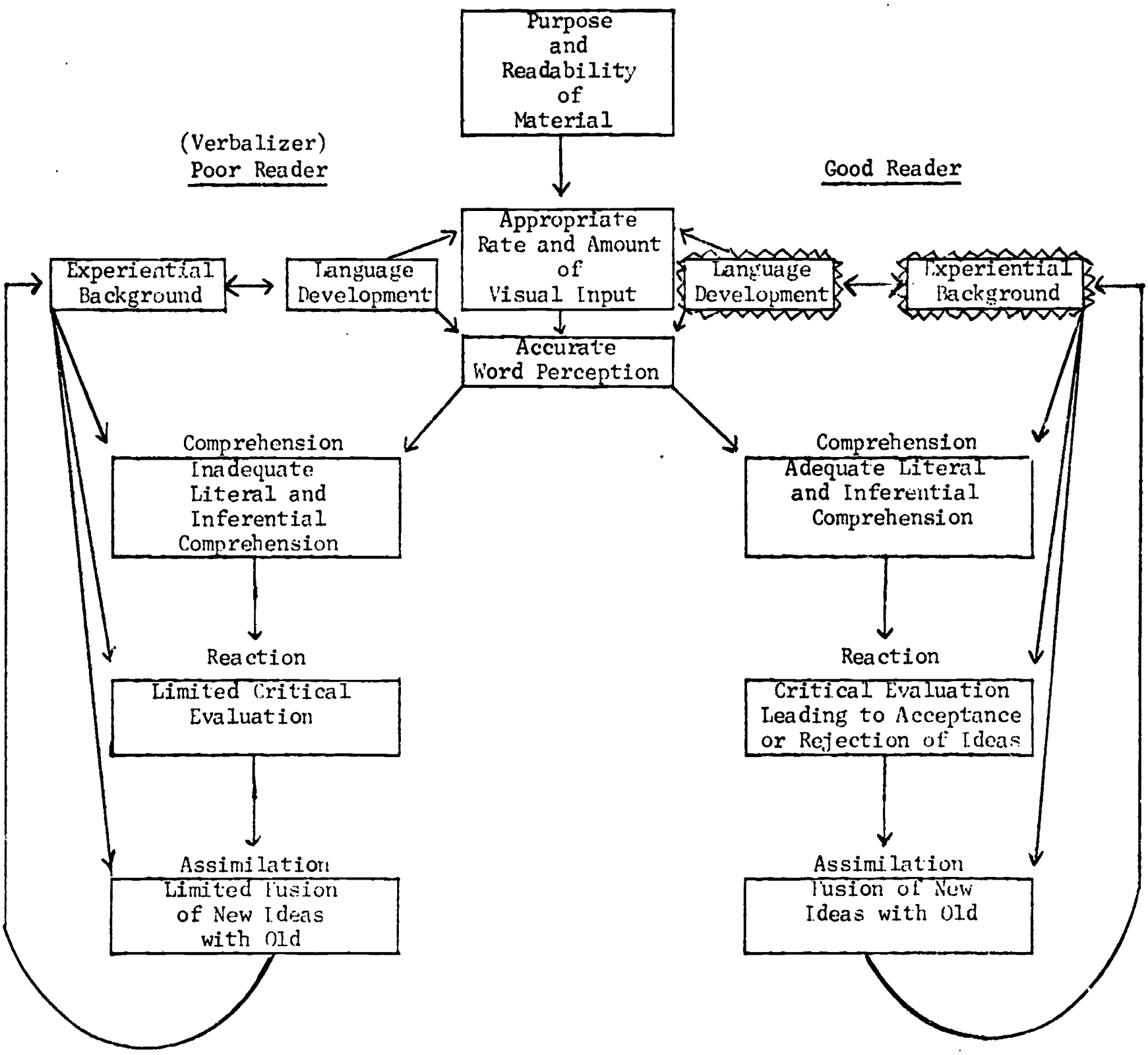
For many years various authorities in the field of psychology, linguistics, and reading have devoted a considerable amount of time and effort in attempting to clarify the reading process through the use of models. Two of the earlier models were those of William S. Gray and Helen Robinson which were mentioned previously in this article. Gray's reading skills model is possibly one of the most referred to in the field. His contribution to our knowledge of the reading process can not be denied.

The model is a series of concentric circles proceeding from the center and each circle encompasses the smaller circle. The center circle is labled word perception. The others are comprehension, reaction, and assimilation. Gray discusses his model as a series of processes that take place as a unitary act when a "good reader" reads.(4)

The findings of this research tend to support Gray's model to some degree. However, consideration must be given to the fact that accurate word perception will not necessarily lead to adequate comprehension of even a literal nature let alone the more complicated mental processes of inferential thinking and critical evaluation.

A model of a different design might assist in clarifying that skill in one process of Gray's model does not necessarily lead to another. The following model created by the researcher tends to portray the

MODEL OF THE READING PROCESS



difference in the results of reading even though both good and some types of poor readers have accurate word perception.

The preceding model suggests that although both the good and poor reader may have an appropriate purpose, rate, and adequate word perception the end results may be entirely different. Accurate word perception does not insure adquate comprehension.

Both good and poor readers make use of their language background to assist them in word perception, and both utilize their experiential background in order to achieve comprehension. However, the poor reader's inadequate ability to successfully make use of the various comprehension skills denies him, to some degree, the use of reading as a vicarious source of increasing his experiential background and language development which in turn may have an effect upon his future ability to comprehend.

Educational Implications

In order for these mental skills to be developed, the teacher must provide opportunities for the child that will permit him to practice thinking at all three levels -- literal, inferential, and critical evaluation.

Since it is a generally accepted fact that the level of comprehension is at least partially dependent upon the reader's purpose, it behooves the teachers to teach the child to set purposes for reading. However, the practice that is commonly suggested in the manuals of most basal readers of providing purposes for the child will not be sufficient. Most psychologists would tend to agree that purposes that

come directly from the child are far more motivating and permit the student to realize that reading is a problem solving activity.

A second practice that would assist students in acquiring the necessary skill to read with a greater depth of comprehension is to ask more questions that require inferential thinking and critical evaluation. Guszak's study "Teacher's Questions and Levels of Reading Comprehension"[5] suggested that 70.4 percent of teacher's questions required literal comprehension. Only 13.7 percent required inferential thinking, and 15.3 percent required critical evaluation. These findings combined with an analysis of the types of questions suggested in a basal reader manual suggest that in some cases teachers fail to use properly the most important tool in teaching comprehension - the question.

Although this research has provided some insight into the relationship between word recognition and comprehension, other research should be conducted using larger samples and at different grade levels. The information gained might clarify even further the role that readability has upon the relationship between word recognition and comprehension.

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