AN ANALYSIS OF THE NATURE OF THE READING COMPREHENSION ACT BY MEANS OF THE RORSCHACH INKBLOT TEST AND DIFFERENTIAL MEASURES OF READING COMPREHENSION

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This is to certify that the

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Byron H. Van Roekel
Major professor

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ABSTRACT

AN ANALYSIS OF THE NATURE OF THE READING COMPREHENSION ACT BY MEANS OF THE RORSCHACH INKBLOT TEST AND DIFFERENTIAL MEASURES OF READING COMPREHENSION

By

John Hoogstra

Purpose of the Study

The purpose of this study is to investigate the relationship between reading comprehension skill and selected aspects of the Rorschach Inkblot Test, and comprehension skill and vocabulary development. It is hoped that such knowledge will increase understanding of the nature of the of the reading comprehension act by supporting those who hold that reading comprehension skill is proportional to the accumulative effect of experience and proficiency with language; by supporting those who hold that integration is the basic cerebral function and gestalt functions are an aspect of this, among others; or by supporting those who contend that gestalt and linguistic functions are similar and may both be related to the same underlying organization factor. This information may also be useful in serving as

a guide in the selection of methods and materials by which to remediate comprehension problems.

Procedures

Thirty fifth grade pupils and 30 seventh grade pupils drawn from schools located in Allegan and Ottawa Counties of Western Michigan were used as subjects. Each group of 30 pupils consisted of 15 pupils classified as poor comprehenders and 15 pupils classified as good comprehenders. The Durrell Listening-Reading Series was used as a criterion measure for classifying pupils either as good comprehenders or poor comprehenders. All subjects were administered a vocabulary test, a battery of differential measures of reading comprehension, and the Rorschach Inkblot Test. Rorschach protocols were scored by both the Beck and Friedman scoring systems.

Conclusions

The data of this study support the following conclusions:

1. Good comprehending students possess significantly larger vocabularies than do poor comprehending students. Comprehension skill is also positively related to data produced by the differential measures of reading comprehension. This suggests that comprehension skill is a unitary trait highly related to proficiency with language.

2. Good and poor comprehenders do not differ significantly in the data they produce in any category of the Beck scoring system of the Rorschach that was used, which some authors state are too broad to assess the tiny amounts of variance unique to comprehension skill.

3. Good comprehenders demonstrate a significantly greater ability to perform more highly differentiated and more meaningfully reintegrated analyses of visual stimuli than do poor comprehenders, based on data produced by a more refined scoring system of the Rorschach.

4. Greater maturation brings about an increasing focal awareness of details, and a greater ability to draw appropriate inferences from the content of passages read.

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CHAPTER I

INTRODUCTION

Interest in the nature of the reading comprehension act is of long standing. Thorndike[1] analyzed the errors of children in paragraph reading and wrote of "reading as reasoning." Judd and Buswell[2] found that eye movements during reading were related to the reader's purpose in reading. In a classic factor analytic study, Davis[3] interpreted the most important factors for reading comprehension as memory of word meanings and reasoning in reading (a combination of weaving ideas together and drawing inferences from them). Thurstone[4] reanalyzed Davis' data and concluded that there appeared to be no evidence to support the identification of specific components of reading comprehension.

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[1]Edward L. Thorndike, "Reading As Reasoning," Journal of Educational Psychology, VIII (June, 1917), 323-332.

[2]William S. Gray, "New Approaches to the Study of Interpretation in Reading," Journal of Educational Research, LII (October, 1958), pp. 65-67.

[3]Frederick B. Davis, "Research in Comprehension in Reading," Reading Research Quarterly (Summer, 1968) p. 543.

[4]Donald Spearitt, "Identification of Subskills of Reading Comprehension by Maximum Liklihood Factor Analysis," Reading Research Quarterly (Fall, 1972) p. 94.

He felt that the correlation coefficients in Davis' data could be accounted for by a single common factor which he labeled general reading ability. More recently Schreiner, Hieronymus and Forsyth[5] investigated the extent to which different types of reading subtests measure unique aspects of reading comprehension. Spearitt[6] again reanalyzed Davis' data by maximum liklihood factor analysis and concluded that four of Davis' factors: recalling word meanings; drawing inferences from the content; recognizing a writer's purpose, attitude, tone and mood; and following the structure of a passage; are identifiable as separate skills. Chapman[7] wrote of a hierachy of comprehension skills and that knowledge of simpler comprehension skills is a prerequisite for more complex problems involving this skill. Guthrie,[8] in testing a theoretical model of the reading process she formulated, questioned the validity of the hierachy of skills and abilities theory. The primary purpose of these

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[5]Robert L. Schreiner, A. N. Hieronymus, and Robert Forsyth, "Differential Measurement of Reading Abilities at the Elementary School Level," Reading Research Quarterly (Fall, 1969), pp. 84-99.

[6]Spearitt, op. cit., p. 109

[7]Carita A. Chapman, A Test of a Hierachical Theory of Reading Comprehension (unpublished Doctoral Dissertation, University of Chicago, 1971).

[8]Harriet May Guthrie, A Factor Analytic Study of Reading Comprehension as the Extrapolated Function of a Three Dimensional Model of the Reading Process (unpublished Doctoral Dissertation, University of Missouri--Kansas City, 1972).

investigations and that of many others was to identify and describe exactly what it is, i.e., what processes are involved, that occurs within one who comprehends printed or written discourse. These investigators have sought to discover the nature of what Brown[9] calls the "click" of understanding, which occurs at that instant at which one acquires meaning from what he has read.

Statement of the Problem

Although the nature of the comprehension act has been extensively researched with a variety of techniques, currently available date concerning this act are not unequivocal. Therefore, it is believed that another attack on this problem, namely, using the Rorschach Inkblot Test, a well known projective instrument, to investigate this process, is justifiable. It is the hope of the writer that this study will contribute to the understanding of the Comprehension Act by producing data that may support one of the positions concerning reading comprehension contained in the literature and discussed below.

Views on Reading Comprehension

From an extensive perusal of the literature, the writer has discerned three broad positions concerning reading comprehension: (1) comprehension skill is dependent

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[9]Roger Brown, Words and Things (Glencoe, Ill.: The Free Press, 1958), p. 82.

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upon background experience and facility in handling verbal ideas; (2) cerebral integration is the basic cerebral function, and understanding ideas presented both verbally and nonverbally may be a component of this function, among others; and (3) language functions and gestalt functions are similar and may be based on the same underlying organizational factors. The latter is essentially a refinement of the other two, more specifically emphasizing relationship between language and cerebral integration.

Language Experience Approach

The proponents of this theory stress the importance of a wide range of, and wealth of, background experience for reading comprehension.[10] These writers speak of mental content or apperceptive mass--the accumulative effect of one's experiences, and note that one's ability to comprehend a given passage is proportionate to the amount of mental content one possesses in that subject area with which the passage is concerned. The importance of proficiency with language is connoted by their stating that developing skill in comprehension is also a matter of teaching students

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[10] Guy L. Bond, and Miles A. Tinker, Reading Difficulties: Their Diagnosis and Correction, 2d edit. (New York, N. Y.: Appleton-Century-Crofts, Inc., 1967), p. 269. States that basically comprehension depends upon facility in the use of concepts or meanings evolved through experience. To be of use in reading these authors believe that such concepts must be attached to words or groups of words as symbols of their meaning.

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to abstract meaning from progressively longer and more complex linguistic structures.[11] Richards[12] most clearly sets forth this position by stating that in interpreting anything, one is letting parallels from the past guide his choice or construction of a meaning. In good interpretation the right parallels are at work; in bad interpretation the wrong ones are.

Cerebral Integrative Approach

Those who take this position view integration as the basic cerebral function and regard the gestalt functions, namely, analyzing and integrating in correct spatial relationships figures such as those of the Bender Gestalt Test as specific aspects of integration.[13] This writer feels

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[11]Henry P. Smith, and Emerald V. Dechant, Psychology in Teaching Reading (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1961), pp. 217-218. These writers concur with Bond and Tinker and state that in addition to providing appropriate experiences, developing comprehension skill is largely a matter of expanding one's vocabulary, and enabling one to derive meaning from progressively longer and more complex thought units. Homer L. J. Carter, and Dorothy J. McGinnis, Diagnosis and Treatment of the Disabled Reader (Toronto, Ontario, Canada: Collier Mac Millan Co., Ltd., 1970), pp. 6-8. Speaks of mental content, the accumulative effect of experience, as the primary requisite for apprehending meaning from what one reads.

[12]I. A. Richards, "What is Involved in the Interpretation of Meaning," in Chicago University Conference on Reading, No. 51: Reading and Pupil Development (Chicago, Ill.: University of Chicago Press, 1940), p. 49.

[13]Alan O. Ross, "Integration As A Basic Cerebral Function," Psychological Reports: Monograph Supplement No. 2 (1955, 1), p. 193.

that those who hold this position would view the combining of elements into specific patterns or meaningful wholes, or forming "gestalts" in which the meaning of the whole is greater than the sum of its parts, as an aspect of integration. Ross cites a tentative, but interesting physiological explanation of this phenomenon:[14]

> "Woolsey reported, and Morgan and Stellar more fully describe a sensory projection area in the cortex which lies lateral to the commonly known sensory areas in the postcentral region. This area has been tentatively called somatic area II and is described as receiving impulses from both the contralateral and the ipsilateral sides of the body and as having not only sensory, but also motor components. The physiology of this area lends itself to the speculation, most guardedly advanced, that the more complex forms of sensory reaction might here have an important locus..."

Some who take this position believe that one's ability to integrate and abstract meaning from complex visual stimuli is developmental in nature.[15]

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[14] Ibid., p. 181.

[15] Heinz Werner, Comparative Psychology of Mental Development (New York, N. Y.: International Universities Press, 1970), pp. 53ff. Werner postulates that there are genetically lower and higher levels of perceptual capability characterized by increased differentiation or breaking the stimulus pattern down into increasingly more and finer details and greater hierarchical reintegration. Louise B. Ames, et. al., "Development of Perception in the Young Child as Observed in Response to the Rorschach Test Blots," Journal of Genetic Psychology Vol. LXXXII (June 1953), pp. 183-204.

Common Factor Position

Proponents of this position hold that there is a relationship between visual integration and language functioning.[16] Others see learning in general as a function of the central nervous system as a whole.[17] Neisser[18] is most

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[16]Katrine de Hirsch, et. al., Predicting Reading Failure (New York, N. Y.: Harper Row, 1966), p. 38. Authors see a substantial relationship between proficiency with drawing figures such as those of the Bender Gestalt Test and abstract ability at later ages. Eleanor J. Gibson, Principles of Perceptual Learning and Development (New York, N. Y.: Appleton-Century-Crofts, 1969), pp. 158-161. Gibson addresses herself to this issue by discussing the Whorfian Hypothesis, which suggests that visual discrimination is in a measure guided by language functions; i.e., that one interprets visual stimuli largely in terms of the concepts available to him from the language he speaks. Gibson, however, believes it is unlikely that perceptual learning is appreciably distorted by language categories. She allows, however, that perceptual learning is likely facilitated by calling attention, verbally, to the distinctive features of "things."

[17]Newell C. Kephart, The Slow Learner in the Classroom (Columbus, Ohio: Charles E. Merrill Publishing Co., 1960), pp. 65-66. Kephart views learning in general as a dynamic process and takes the position that any input situation arousing the integrative function brings about a more or less permanent change in the neural units themselves. He further states that learning is thus bringing about more and more change in the development of the individual because integration functions associate incoming stimuli with past experience. Carl H. Delaccato, The Diagnosis and Treatment of Speech and Reading Problems (Springfield, Ill.: Thomas Publishers, 1965), pp. 47-67, 102-135. Delaccato's theory relates language and central nervous system functions by postulating that differential language functions can be equated with stages of development of the nervous system. He attributes reading and speech difficulties largely to missed steps in development of the central nervous system which he advises can be remediated by patterning.

[18]Ulric Neisser, Cognitive Psychology (New York, N. Y.: Appleton-Century-Crofts, 1967), pp. 245-247.

specific on this point and expresses the view that there are common attributes in sentence comprehension and gestalt psychology. For Neisser, word order or syntax is most important for sentence comprehension. He, however, sees a deeper structure involved and mentions that in sentence comprehension, the whole is more than the sum of its parts, a tenent he notes is also held by gestalt psychologists.

Anderson and Ausubel[19] do not postulate a relationship between visual integration and comprehension of verbal or printed material, but stress the organizational factor in what they refer to as meaningful receptive verbal learning. They have formulated the "subsumption theory" of verbal learning, an interesting construct to explain the process by which one arrives at an understanding of verbal material presented to him.

Significance of the Study

A practical matter faced by elementary English and remedial reading teachers is the selection of appropriate

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[19]Richard Anderson, and David P. Ausubel, Readings in the Psychology of Cognition (New York, N. Y.: Holt Rinehart and Winston, Inc., 1965), pp. 84ff. These writers stress the organizational factor by recommending the use of "advance organizers" to provide appropriate "subsuming concepts" or a structure of relevant background information to which new learning can be related. The writers also argue for "integrative reconciliation" by which they denote cross referencing of new information with information currently stored so as to reconcile real or apparent inconsistencies and thereby integrate new learning into a unity with existing knowledge.

remedial materials and procedures for students who have difficulty comprehending what they read. Knowing which of these positions can be best supported, and knowing which remedial techniques and materials are logically consistent with it, should increase the probability that maximally effective materials and procedures will be selected. Should skill in reading comprehension relate solely or primarily to vocabulary development and language proficiency, then one could conclude that a sound systematic program for developing language skills would adequately meet the needs of students in this area, that the language experience approach should be used to remediate comprehension problems, and that this approach should be submitted to further study to more clearly demonstrate its effectiveness. However, should skill in reading comprehension also relate to a basic organizational factor, then it is felt additional approaches should be explored. At earlier ages, children might in this case profit from patterning procedures. At later ages such activities as integrating visual forms or putting puzzles together, extended use of special materials designed to develop visual discrimination and fine motor control, and figures such as the incomplete man or such other incomplete figures as might be developmentally devised, might merit consideration and further investigation.

Rationale of the Study

This, then, raises the question as to which of these approaches can be best supported. A defensable way to deal with this problem would be to select and administer measures capable of producing data which would either support or refute these positions. The Rorschach Test provides a measure of visual integration, including the subsidiary process of organization. The vocabulary subtest of the Iowa Test of Basic Skills provides a measure of vocabulary development from which, it is believed, proficiency with language can be inferred. Comparison of the scores produced by response of good and poor comprehenders to both the Rorschach Inkblot Test and this vocabulary subtest by means of a statistical procedure designed to determine significance of differences could lend support to one position or the other, or could suggest the extent to which the two are related, and thereby support or refute the third position. This is the focus of this study.

Purpose of the Study

The objectives of this study are as follows:

1. To determine whether there is a significant difference in the ability of good and poor comprehenders to integrate and organize dispersed details in visual stimulus patterns. The location dimension of the Rorschach Test provides this measure. This dimension has to do with the

amount of the stimulus that is used in the making of an interpretive response, and in cases where the total stimulus is not used, the detail or details that are used, which are numbered for purposes of scoring. The study determines whether good comprehenders produce significantly more W responses than do poor comprehenders who in turn produce significantly more D responses. The W response generally requires greater mental integration, and a higher number of W responses in a Rorschach protocol is associated with abstract or conceptual ability and achievement drive. This one would expect of the good comprehender.

A response is scored W when the total stimulus, or almost all of it, is used. D denotes the use of a detail or combination of details in the making of a response. Dd denotes the use of a small or "rare" detail, seldom used by those of the standardization sample.[20]

Some W responses are made with relative case; others require greater integration. Especially in response to more unified stimulus situations, one can quite quickly arrive at a W response after taking a cursory look largely at the outline of the stimulus. Such are called instantaneous or "lazy" W's. Other W's, in response to more dispersed, less connected stimulus situations, require greater

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[20]Samuel J. Beck, Rorschach's Test, Vol. I (New York, N. Y.: Grune and Stratton, Inc., 1961), p. 24.

mental activity. This latter type is considered by Rorschach authorities[21] to indicate intellectual ability and achievement drive. Unfortunately, the standard Rorschach scoring system does not differentiate between these types of W: all are simply scored "W". To differentiate between these types of response and to obtain a finer measure of the mental activity involved, Rorschach protocols were subsequently scored with the Friedman scoring system.[22]

2. To determine whether good comprehenders indicate significantly higher quality of form than do poor comprehenders; that is to assess the relative accuracy with which good and poor comprehenders perceive and know realities as Beck[23] puts it. It appears plausible to suppose that in addition to amount of background experience, one's ability to comprehend also relates to the accuracy with which one cognizes experience or interprets the stimulation he receives.

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[21] Ibid., p. 13-14.

[22] Howard Friedman, "Perceptual Regression in Schizophrenia: an Hypothesis Suggested by the Rorschach Test," Journal of Genetic Psychology LXXXI (September, 1952), pp. 63-98. The Friedman scoring system refines the Beck scoring system of the Rorschach Test by assigning more credit to responses giving evidence of the subject's having integrated details into larger details or wholes, or having attended to internal characteristics of the area involved in the making of the response as well as the outline form. Such responses are assigned to categories which denote greater organization.

[23] Beck, op. cit., p. 130.

A good form response, scored F+, is one in which the response conforms to the configuration of the stimulus, i.e., has the same shape. A poor form response, scored F-, does not conform to the configuration of the stimulus upon which it was made. Plus and minus scores are determined from a table devised for this purpose, which is a part of the Beck scoring system. Inasmuch as everyone, or almost everyone, makes both good and poor form responses to the Rorschach Test, the F+ percentage (F+ responses/F+ plus F- responses x 100) is used as an index to assess the relative accuracy with which one interprets visual stimulation.

3. To determine whether the good comprehender displays a significantly more flexible approach to visual stimuli: i.e., does the good comprehender consistently attend to the total figure first, when responding to the Rorschach, and then to component details--going from wholes to parts; or does his approach vary, at times attending to integral parts first and then to the total figure--going from parts to the whole. Beck emphasizes that human beings seem to be so constituted that they do not consistently proceed from detail to whole responses.

4. To determine whether good comprehending students achieve significantly higher scores on a standardized vocabulary test than do poor comprehenders. Vocabulary is generally regarded as a reliable estimator of proficiency with language as well as an indicator of word knowledge.

Hypotheses

The following specific hypotheses are tested:

H1: Good comprehending fifth and seventh grade students will not produce significantly more W responses to the Rorschach Test than will poor comprehending fifth and seventh grade students. Poor comprehending students will not produce significantly more D responses to the Rorschach Test than will good comprehending fifth and seventh grade students.

H2: Good comprehending fifth and seventh grade students will not achieve significantly higher F+ percentages in response to the Rorschach Test, scored according to the Beck scoring system, than will poor comprehending fifth and seventh grade students.

H3: Good comprehending fifth and seventh grade students will not display a more flexible approach to Rorschach stimuli than will poor comprehending fifth and seventh grade students.

H4: Good comprehending fifth and seventh grade students will not achieve significantly higher scores in response to the vocabulary subtest of the Iowa Test of Basic Skills than will poor comprehending fifth and seventh grade students.

Ancillary Information

Additional information was acquired in this study which may help to clarify secondary issues which appear germain and pertinent to this subject.

The Friedman scoring system, in accord with which Rorschach protocols were also scored, refines the organizational category of the Rorschach. In addition to the broad W and D classifications, this system differentiates the level or amount of organization inherent in responses in

both categories. It takes into account the extent to which dispersed details are integrated into wholes or larger details. It also takes into account whether responses are based upon outline form only, or whether a highly analytic approach was used and the response involved small details within the form as well; i.e., the response "a bat" to card I could be made on the basis of outline alone, whereas the response "a dark furry bat with spots on his wings" would demonstrate involvement of internal characteristics of the blot as well as outline form in the making of the response. There are indications in the literature cited in following chapters that the standard categories of the Rorschach may be too broad to have predictive value for academic success, that the organizational factor of the Rorschach may be related to academic success, and that refinements of the standard categories may be helpful in determining the extent to which this organizational factor is related to academic achievement. The Friedman scoring system is a refinement of the location category of the Beck scoring system.

The area of comprehension was differentiated and refined by administration of a battery of subtests constructed by Dr. Robert Schreiner, under the direction of Dr. A. Hieronymus and Dr. R. Forsyth, at the University of Iowa in 1968. This instrument differentiates comprehension into a number of subskills such as noting details, verbal reasoning and inferential comprehension. It seems plausible to

assume that functions such as verbal reasoning and inferential comprehension entail "higher order" thought processes than does noting details or literal comprehension.

Definition of Terms

Cerebral Integration--For this study the writer uses the term as defined by Ross.[24] "...the function which combines and relates discrete cues in order for a unified response to occur. Cues may be either internal, external or both. Responses may, similarly, be either covert, overt, or both. For certain forms of integration, a subsidiary process, differentiation, must be postulated. This would be operating where several discrete or related cues are simultaneously received by the organism and need to be held apart so that an integrated response may follow..."

Cerebral Integrative Approach--Denotes the position taken by those who believe that cerebral integration as defined above is the central and basic function of the central nervous system, and the gestalt function is a specific aspect of this basic function.

Common Factor Approach--In this study the term denotes the position taken by those who hold that visual integration or the gestalt function, such as that of analyzing and reproducing figures such as those of the Bender Gestalt

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[24]Ross, op. cit., p. 191.

Test, and language functions are related, or are both aspects of this same integrative factor.

Comprehension--In this study the term is used to denote the understanding of spoken language and the printed word, as assessed by the Durrell Listening-Reading Series.

Visual Integration--The term in this study denotes the integrative function, as defined above, but limited to integration of visual stimuli.

Assumptions and Limitations

1. This study investigates only visual integration. There are other facets of integration and other means by which they can be assessed. However, the writer chooses to study only visual integration based on subject's response to the Rorschach Inkblot Test.

2. It is assumed, largely by face validity, that the Friedman scoring system of the Rorschach Inkblot Test does differentially assess integrative and organizational skill.

3. It is assumed that proficiency with language in general can be quite reliably inferred from one's response to a vocabulary test. It is, therefore, assumed that the vocabulary subtest of the Iowa Test of Basic Skill is a quite reliable index of proficiency with language.

Organization of the Remainder of the Study

A review of the literature concerning reading comprehension, the literature concerning the validity of the Rorschach Inkblot Test, and studies reporting the use of the Rorschach to investigate academic variables is presented in Chapter II. Chapter III begins with a statement concerning the design of the study, continues with a description of the measurement instruments used, the selection of subjects, method of data collection, and ends with a description of the statistical treatment of the data. The results are presented in Chapter IV. A summary and discussion of implications comprises Chapter V.

CHAPTER II

REVIEW OF RELATED LITERATURE

Reading comprehension and the Rorschach Inkblot Test both receive extensive attention in the literature. Inasmuch as the focus of this study is on cerebral integration (as measured by responses to the Rorschach Inkblot Test) of good and poor comprehenders (as determined by tests of reading and listening comprehension), a sampling of the literature dealing with the reading comprehension act in general and of the literature concerning the Rorschach Test in general are presented first. The chapter concludes with a discussion of studies which relate the Rorschach Test to cognitive skill, academic achievement, and proficiency in verbal reasoning.

The Nature of Reading Comprehension

Numerous investigations have dealt with the process of reading comprehension and the development of conceptual models to portray what it is that takes place when a linguistic form is understood.

Most authorities in the field of reading conceive of comprehension as a process whereby one relates the

cumulative effect of previous experiences to the content of the passage one is seeking to understand. Martin (1955) states that children who have rich experiential backgrounds are better equipped to attack the printed page than are pupils of meager backgrounds because of the varied meanings and thoughts the more experienced bring to the task. Serra (1953) believes that the more direct the experience on which a concept is built, the greater will be the individual's knowledge and understanding of that concept. Knowledge of word meanings according to Levine (1970) is a universal skill which can transfer from one subject matter area to another. But comprehension skill does not. Rather, a specific background knowledge is required for each area one desires to read with understanding.

Richards (1940) concisely suggests that in interpreting anything, one allows parallel situations from one's past to guide his construction or choice of meaning. In good interpretation, the right parallels are at work; in bad interpretation, the wrong ones are.

Gray (1954), in a similar vein, claims that mature readers have well worked out philosophies with reference to which they relate ideas gained through reading. He further notes that mature readers have compelling interests and motivations outside themselves, as opposed to immature readers who read more for survival and ego satisfaction.

Gliessman (1968), drawing from O. Hobart Mowrer's theory of sentence conditioning, argues that words become conditioned to their referents, and come to evoke the same response the referent evokes by second order conditioning. As the bell became conditioned and evoked salivation in Pavlov's dog, as was done initially by meat, so, for Mowrer and Gliessman, words come to evoke the same response that is evoked by the referent. Mowrer observes that words can produce different images or reactions, some positive and some negative. Most persons have had pleasant experiences with good dogs, and unpleasant experiences with mean ones. The word dog, therefore, would evoke a neutral or an ambiguous response. For Mowrer, the predicate of the sentence determines what image or response concerning the referent the subject or stimulus word would evoke; i.e., one decides whether good dogs or bad dogs are being referred to by what is said about them in the predicate.

Brown (1958) is concerned about the pitfalls of all "specific image" or "particular response" theories, and expands upon the notion of conditioning. He notes that concepts exceed space-time frames which appears inconsistent with the specific image theory, and further notes that many persons do not report these specific images. Brown is further concerned about the empirically demonstrable fact that responses to specific linguistic forms are not invariant. This leads Brown to consider the selectivity

factor in Pavlov's original experiment. Brown reports that salivation was not the only unconditioned response evoked in Pavlov's dog by the meat. The dog must have barked, yelped, and jumped around as well as salivated. However, Pavlov apparently attended only to salivation, a part of the total response. This leads Brown to posit that the meaning of words or "signs" is a dispositional property and that acquisition of meaning disposes one to react in a variety of ways consistent with this disposition. Brown notes that one with different attitudes or under different circumstances will react somewhat differently to the same statement. However, all these reactions have some commonality that is in accord with the general disposition evoked by the statement.

Edward Thorndike (1917) believed that comprehension was in large measure dependent upon a knowledge of relationships. Thorndike did not downplay the importantance of knowledge of word meanings, but in addition, or perhaps of greater importance, indicated that a knowledge of relationship words --prepositions such as on, over, under, in contrast to, is a prime requisite to efficient and accurate comprehension.

Rothkopf (1965) sees comprehension as the product of what he calls mathemagenic (giving birth to learning) behaviors which the reader applies to the passage he is considering. It is these mathemagenic behaviors, which he defines as those activities in which the subject engages

when confronted with an instructive document, that determine the character of the effective stimulus and in turn determine what is learned. He found that these behaviors can be effected by changes in instructions, and also by the type of testing and amount of testing interspersed in the reading period. More specifically, Rothkopf sees comprehension largely in terms of associations of temporal contiguity, as expressed by the formula: articulated response (ra_1) + (ra_2) previously conditioned or prompted responses = (Sa_2) or associated responses.

Significant Summaries of Research on Reading Comprehension

Although numerous articles dealing with research on reading comprehension appear in the literature, relatively few report data from well devised research designs and contribute significantly to one's understanding of this process. Davis and Gray present the most comprehensive summaries of significant research in this area known to this writer.

Davis

According to Davis (1968), interest in reading comprehension began during the first half of the twentieth century; previously it was assumed that comprehension would take care of itself given adequate word recognition skill. Davis cites an incident where Horace Mann found a fluent

"reader," who, when asked to read a newspaper Mann had with him, read across the entire page fluently, apparently oblivious to the fact that different and unrelated events were reported in the articles occupying the different columns.

The first study of note, according to Davis, was that of Thorndike (1917). Thorndike discovered that even when pupils understood the meaning of individual words in a paragraph, many of them made errors in answering questions about it. Thorndike analyzed the errors made by elementary school pupils in writing the answers to simple questions based on short paragraphs. The nature of these errors led him to conclude that the pupils were unable to use relational words and phrases such as but, and, on the contrary, to fit together the separate ideas expressed or give to the individual words or word groups the proper amount of emphasis with respect to one another. Thorndike viewed reading comprehension as a process much like that by which one solves a problem in mathematics. One must discard the irrelevant and use the significant information in such a way as to gain the right meaning according to the author's purpose. Those elements in the paragraph that stand out above others in the reader's mind Thorndike referred to as "over potent," those which receded, as "under potent."

Davis cited a study by Alderman in which it was found that drill work in vocabulary and practice in

organization, which consisted of selecting the central thought of each of a number of paragraphs and arranging them logically according to the writer's purpose, proved to be most effective. Many articles stressing the importance of organization are cited below. Similar to this, Davis cited an unpublished doctoral dissertation by Irion, done in 1925, in which low correlations were found between ability to answer factual questions and to determine the writer's main point and conclusions. This is consistent with other studies Davis cites, including those by Betty Tier Berry and Touton and Berry, which suggest that comprehension is impeded by lack of organizational skills such as (1) inability to understand fully the question to be answered, (2) inability to isolate the elements of an involved statement read in context, (3) inability to associate related elements of the context, (4) failure to grasp or retain ideas essential to the understanding of additional concepts, (5) failure to see the setting of the context as a whole, and (6) irrelevant answers of various types.

Dewey (1935) investigated the relation between the ability to obtain facts and to do inferential thinking regarding historical material and concluded that tests which measure one's ability to obtain facts cannot be assumed to measure ability in inferential thinking as well.

Feder, who according to Davis (1968), did the first factor analytic study of reading comprehension, described

the Comprehension Maturity Tests and collected data which showed that reading for information and reading for inferences are relatively independent skills. Betts (1956) quotes three doctoral studies and differs with Feder and suggests quite substantial relationships between the abilities to do literal and critical reading. He further found that verbal intelligence is highly related to both.

Davis (1968) further quotes studies by Harris, Lyman C. Hunt, and Alshan, all using factor analytic techniques, all finding that comprehension correlated only with vocabulary, or perhaps vocabulary and reasoning in reading. Davis' general conclusion is that comprehension rests on word knowledge and reasoning in reading--a combination of weaving ideas together and drawing inferences from them.

Davis, in summarizing what he considers the most important empirical studies of reading comprehension over the last half century, stated that to be useful the studies must use carefully written and selected items to differentially measure skills, must use large samples of examinees and highly refined statistical techniques if tiny amounts of variance unique to each subskill are to be detected.

Gray

Gray's (1958) summary of what he regards as significant research in interpretation in reading reflects a different position from that of Davis. Gray reports and

appreciates the contribution made by the factor analytic studies summarized by Davis (1968), but indicates greater interest in studies using introspective and retrospective techniques.

Gray quotes Piekarz (1956) who investigated the relationship of emotional factors and skill in interpreting what is read. Although the study is open to much criticism on methodological grounds since only two subjects were used, Piekarz states that less emotionally involved readers are more able to view the selection impersonally and to see both sides of an issue objectively. Piekarz stated that better readers, even though they experienced strong feelings towards the ideas presented, were able to control their reactions and to distinguish clearly between their own opinion and the opinions of the author. Piekarz noted further that poorer readers limited their responses to literal meanings and gave only passing attention to implied meanings and critical reactions. They had trouble in maintaining an objective attitude and in distinguishing between their own and the authors ideas. Many of the words read stimulated the recall of experiences that led them far beyond the author's intended meanings, and were highly personal in nature.

Gray and Rogers (Gray, 1958) used interview and retrospective techniques in a study which they feel supports the

conclusions of Piekarz. They found that mature readers mastered skills of word recognition, concentrated on the evaluation of ideas read, and reconstructed these into patterns that served their purpose. Mature readers were found generally to exhibit compelling interests or a central point or radix which influenced directly the nature of the interpretations made.

Gray also quotes a work by Bloom and Broder who used both introspective and retrospective techniques. Gray agrees with the findings of this study and indicates that interpretation in reading is analogous to problem solving. The reader accomplishes this typically in three steps: (1) the reader first attempts to dispose of unfamiliar items, (2) he selects a point that stands out as a possible starting point, and (3) he attempts to limit the problem. These investigators also found that problem solving is accompanied by tension followed by relaxation when the problem is solved. They found, as did Thorndike, that in the process of problem solving some details appeared to stand out and occupy the foreground of attention while other details receded to the background.

Studies Investigating the Relationship of Reading Comprehension to Specific Factors

Many studies in the literature investigate the relationship of specific factors to reading comprehension.

Studies which investigate the relationship of reading comprehension to factors closely associated with it, such as intelligence, are presented. Following these studies are those which examine the relationship of reading comprehension to factors, such as intonation and oral peak stress, which are less closely associated with it.

Intelligence and Language

Hage and Stroud (1958) found that reading comprehension and reading rate correlated significantly with both verbal and nonverbal scores of the Wechsler. A slightly higher correlation was found with verbal intelligence scores. Artley (1951) asserts that reading comprehension correlates more highly with intelligence than with any other factor. Betts (1956) also found a positive relationship between verbal intelligence and the ability to do both literal and critical reading. Closely related to this, Martin (1955) states that the concepts of good readers are more efficiently organized and have significantly greater clarity.

Artley indicates a strong relationship between language proficiency or "linguability" as he refers to it and reading comprehension (1959). He quotes an unpublished doctoral dissertation in which it was stated that those below the lowest quartile in reading have one chance in 10 of being above the mean in word meaning, three chances in 10 of being

above the mean in spelling, one chance in 10 of being above the mean in language usage.

Many investigators consider the relationship of reading comprehension to organizational variables. Reddin (1970) found significantly greater comprehension when children read passages with language patterns resembling those of spoken language. He quotes a study by Strickland in which the same conclusion was reached. Allen (1964) concurs with Reddin and states that children have a "feel" for simple sentence structure, i.e., Subject--Predicate--Object, and further believes that children require help with more complicated sentence patterns. Abrams (1966) found that the ability to recognize the structure of a written message correlated positively and significantly with reading comprehension. He, however, noted that the Nelson Denny Scale, used to measure comprehension, required some organization and thus overlapped the Knower-Goyer, used to measure organization. Walpole (1945) apparently feels strongly enough about the relationship of language structure and reading comprehension to recommend that children learn sentence structure by drill. He, interestingly, recommends that comprehension of given passages be strengthened by what he calls "analytical paraphrase." He recommends that students, to avoid a simple swapping of synonyms, write a precis of various passages by translating them into a foreign language ideally, or else in

English but with a vocabulary more restricted than that with which the passages were written. Wardhaugh (1968) states that a deep knowledge of syntactical relationships or sentence structure, and a consistent semantic reading is necessary for comprehension.

Other investigators suggest that comprehension is not facilitated by broader organizational factors such as use of headings and summaries. O'Donnell (1962) observes that there is no statistical evidence presently available that proves the efficacy of organization. Parker (1962) found that organizational aids improved immediate but not long term comprehension. Christensen and Stridahl (1955) found that organizational aids, such as headings and summaries, had no effect on comprehension skill of Air Force basic trainees. Serra (1954) states that simplifacation and amplification on concepts has no appreciable effect on comprehension. She indicated that simplification of vocabulary has less effect on comprehension than simplification of language structure.

Other Factors

Cromer et. al., (1966) hypothesized that reading skill requires that the individual be able to use the partial information derived from scanning the printed material and have available patterns of responding to those cues that are consistent with occurrences within one's own language. These authors found support for this contention in the fact

that poor readers responded with less consensuality than did the good readers on the story reading, cloze, and word association tasks used to measure such skills.

Lefevre and Fries (1971) maintain that patterns of intonation constitute one of the most significant systems by which meaning is signalled in language. Closely related to this, however, no support was found for oral peak stress (those words which the author or competent judges stress when they read the material aloud) (Hanitchak, 1955).

Oakan et. al. (1971) suspected that identification was a requisite for reading comprehension, but this was not supported by their data.

There are also articles which treat the relationship of emotional factors and reading comprehension. As noted above, Piekarz (1956) with a very limited sample concluded that emotional involvement diminished ability to accurately comprehend and interpret material read. Artley (1951) quotes an unpublished doctoral dissertation done at the University of Chicago in 1946 in which it was concluded that critical reading was greatly reduced when prejudice or negative attitudes toward that subject were present. It was further concluded that critical reading was unaffected by neutral and positive attitudes.

McCullough (1957) states that people generally set out to accomplish goals they set for themselves, and generally

get what they work for, if the goal is within their capability. She believes that free and wide reading alone will not develop all the types and depth of comprehension that one should have. She maintains that students must learn literary appreciation--the various facets of literary merit must be taught directly.

Rorschach Inkblot Test

The literature concerning the validity of the Rorschach Test is extensive and equivocal. Divergent opinions are stated: interpretation of this literature requires appreciable thought. It is difficult to evaluate this multidimensional instrument which imposes but little control upon those to whom it is administered.

Woolfe and Woolfe (1957) maintain that the Rorschach is a valid instrument. These authors quote studies in which a quite high agreement was found between Rorschach interpretations and teacher appraisals, blind diagnoses and psychiatric evaluations.

Rabin (1951) describes some interesting studies in which consistent Rorschach signs were gotten for the same individual under conditions of wakefulness, sleep, and hypnosis. Rabin quotes a study by Williams who investigated the Rorschach indicators of intellectual control--C and F+ variables under differering degrees of stress. This investigation required 25 male subjects to practise Wechsler

Bellevue digit repetition under optimal and subsequently under stressful conditions. Williams obtained a correlation coefficient of .74 on the F+ variable, which led him to conclude that the Rorschach, at least in this regard, is a valid instrument.

Ames, et. al.(1953) concluded that response to the Rorschach is developmental in nature. They found, after testing 50 New Haven subjects of high average to superior intelligence at half year intervals from two and a half through 10, that growth of the "perceptual" processes occurs in structured, patterned stages, as does physical and behavioral growth. Brooks and Phillips (1958) differ with Ames, et. al. Using Werner's developmental theory as a conceptual framework, they concluded that the Rorschach response was not developmental in nature. They stated that neither genetically high nor genetically low scores showed any consistent pattern of relationships with the classification of tasks according to the stages of cognitive development.

Chambers and Hamlin (1957) conducted a study involving "blind" diagnoses or interpretations of Rorschach protocols. These investigators used 20 psychologist judges to rate five Rorschach protocols each representing one of the following groups: (1) Involutional depression, (2) Anxiety neurosis, (3) Paranoid schizophrenia (4) Brain damage, and (5) Adult mental deficiency. These authors reported that

the judges attained "a high degree of success" in identifying the Rorschach of the adult imbecile. These judges, however, were reported to be right only about half the time in distinguishing between depression, neurosis, paranoid schizophrenia, and brain damage. On the basis of these findings, the authors concluded that this degree of success is certainly not impressive enough to justify the expansive claims for the value of the Rorschach as a technique in identifying patient groups.

Karon (1968), in dealing with the problem of validity, allows that the Rorschach may indeed be in error in cases where it does not correlate significantly with various criteria. He, however, recommends that one carefully consider the alternate hypothesis, that the criterion is inappropriate. Criterion measures are usually direct and straightforward, providing the means to distort if one is so inclined, or bring defensive strategies into play. This is less likely to occur in response to the Rorschach in which it is likely that the subject does not know what the examiner is looking for.

Blatt, et. al. (1969) suggests that the conventional Rorschach categories are only a gross classification system which requires further differentiation, qualification, and integration if meaningful data are to be obtained and valid inferences drawn. These authors go on to suggest that many

of the prior negative and inconclusive findings in the research with the Rorschach may be a function of the mechanical use of a technique without the subtle, yet vital differentiation made in the clinical application of the Rorschach. In clinical settings, this scale may provide an opportunity to observe subtle, but important aspects of behavior which would otherwise go unrecognized.

Much of the diversity of opinion and contradictory findings reported in the literature may result from the fact that the Rorschach is a multidimensional test which is broad in scope. All categories have not been standardized to a similar degree of precision. Yet configurations upon which interpretations are based take into account all variables. This writer feels justified in making the generalization that the broader in scope an instrument is the more comprehensive and richer data it will produce; but, unfortunately, it will produce this data with lower reliability. A vocabulary test, measuring one dimension, will in general be more reliable than one measuring facets of English and social studies as well. All of this leads to the general conclusion that this is a broad issue for which definitive answers are few.

Rorschach Test and Cognitive Functions, Academic Achievement and Verbal Reasoning

Of greater interest are those studies which deal with the relationship of the Rorschach Test to cognitive variables, academic achievement, and verbal reasoning.

Philips, Kadan, and Waldman (1959) quote an unpublished doctoral dissertation in which it was suggested that a regression of cognitive function occurs during adolescense.

McCandless (1949) found that the Rorschach Z score (the Z score assesses organizational ability) failed to discriminate between high and low achieving Air Force trainees. He, however, noted some trends: he saw high grade point men as more controlled emotionally or as having less emotion to control, slightly more productive, and on most criteria slightly less anxious. They also showed more conformity, which is consistent with the findings of Cromer and Wiener (1966).

Clark (1958) quotes a study by Ruth Munroe which suggests that the Rorschach achieved great success in the prediction of academic achievement. Another quoted study, done by Grace Thompson, produced a correlation of .74 between group administered but individually scored Rorschach protocols and grades achieved in beginning psychology courses at Santa Barbara College. Thompson stated that achievers

tended to concentrate their Rorschach protocols into fewer responses. This is contradictory to the findings of McCandless, but may be accounted for by the fact that the Rorschach was group administered: it has been suggested that subjects make fewer unique or unusual responses with group administration. Thompson also noted that achievers produced fewer chromatic responses, and used shading to a higher degree. Achievers also tended to be more conforming. However, these latter mentioned characteristics of high achievers were not observed in subsequent studies done by Thompson.

Rust and Ryan (1953) noted no significant differences in any other Rorschach category, but found high achievers to produce significantly higher P scores (popular response, considered by Rorschach authorities to indicate conformity).

Sinnett and Roberts (1956) used as subjects students attending classes at the Educational Skills Clinic at the Counseling Bureau of the University of Minnesota. These researchers investigated the relationship between Rorschach response and response of these subjects to questions involving both generalizations and details contained in the paragraph comprehension section of the Diagnostic Reading Tests. There may have been some "trick" questions involved; alternatives which were factually correct but not correct in relation to the material read. They concluded that there is no

support for the hypothesis relating Rorschach approach and thinking in terms of generalizations or details. They did indicate, however, that there is evidence that Z (the measure of organizational ability on the Rorschach) is related to selecting more highly organized responses in a structured cognitive task. It was also noted in this study that when compared with Rorschach variables, vocabulary is a better predictor of performance regarding relevant details and generalizations.

Sisson and Taulbee (1955) quote hitherto unpublished findings concerning the relationship between organizational ability on the Rorschach (Z score) and verbal reasoning. Blatt, for his doctoral dissertation at the University of Nebraska in 1953, studied the relationship between the weighted Z score (Beck's weighting system) and verbal reasoning as determined by response to the verbal reasoning subtest of SRA's Primary Mental Abilities Test. Blatt obtained correlation coefficients he reported as significant at the .01 level. Blatt concluded that the Z score is most closely related to particular kinds of intellectual abilities, specifically those involving capacity to understand ideas expressed in words, to solve logical problems, and to foresee and plan. This study is open to criticism on the ground that it uses a relatively small sample. The Blatt study differs from the present study in that it investigates the relationship of Rorschach data to proficiency in verbal reasoning only. It, however, is of great interest to this

writer inasmuch as the findings and conclusions are essentially the same as those of this dissertation. The consistency of the findings of this study with those of this dissertation done approximately 20 years apart lends support for the contention that organizational ability, as inferred from response to the Rorschach Test, is a component in the reading comprehension process.

The consensus of the literature seems to be that the general categories of the Rorschach scoring system are too broad to have any degree of predictive value for academic success or reading comprehension skill. However, there are indications in the literature that the organizational dimension of the Rorschach, as scored by the Friedman or other refinements of the standard scoring systems, is related to grasping ideas, solving problems, and academic success.

CHAPTER III

PROCEDURES

The design of this study and the measurement instruments used are described in this chapter. The manner in which the subjects were selected and the data collected is also described. The schools the subjects attended (all of them in Allegan and Ottawa Counties of Western Michigan) are identified. The chapter closes with a statement of the statistical procedures applied and the manner in which the data were treated.

Design

The study was designed to investigate the relationship between reading comprehension skill of fifth and seventh grade subjects and selected categories of the Rorschach Test and differential measure of comprehension. The design is crossed: all subjects were administered all measures. Main effects are comprehension skill, grade, and interaction. The design is diagrammed on the following page.

Description of Tests

The Durrell Listening-Reading Series was used to assess the ability of the subjects to understand spoken

Design of Study

		T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15
Good Comprehenders	5th Grade															
	7th Grade															
Poor Comprehenders	5th Grade															
	7th Grade															

language and printed words. The Paragraph Listening and Paragraph Reading Subtests of Form DE, the Intermediate Level and the Advanced Level, served as criterion measures to classify fifth grade pupils and seventh grade pupils respectively according to skill in comprehension.

The Paragraph Listening Subtest of the Intermediate Level consists of eight passages, each of which compares and contrasts two people, animals, places, or things. Each passage is followed by eight statements which the examinee is asked to classify as true of the one, true of the other, true of both, or as information not given in the passage, e.g., if John and Bill were the main characters in the passage, the response choices would likely be (1) True only of John, (2) True only of Bill, (3) True of Both, (4) Information not given. The passages and response choices are read aloud by the examiner so that the examinee is tested only on his comprehension of spoken language. The Paragraph Reading Subtest parallels the Paragraph Listening Subtest in format and content but all parts are read by the examinee.

The Paragraph Listening Subtest of the Advanced Level contains two parts. Part A consists of five passages, each of which is followed by five items which the examinee is to judge as true, false, or as information not given in the passage. A sixth item following each passage is multiple-choice offering four options. Part B consists of three

passages comparing or contrasting two people or places that are in some respects similar but in other ways different. Each passage is followed by six statements which the examinee is asked to classify as true of the one, true of the other, true of both, or as information not given in the passage. The Paragraph Reading Subtest, Advanced Level, parallels the Paragraph Listening Subtest in format and content but all parts are read by the examinee.

The Durrell Listening-Reading Series is, to the writer's knowledge, the most recent instrument of its type and the only one designed to permit direct comparisons between reading and listening comprehension. The authors devised and carried out an extensive tryout program to make it possible for them to construct the listening and reading subtests with items of approximately equal difficulty. All items were subjected to tryout in both reading and listening functions. Difficulty and discrimination indexes were computed. Items were subsequently checked for thesaurus level of difficulty before placement into either reading or listening subtests. The authors state (Durrell, 1969) that the results of reading and listening tests are comparable on a grade equivalent and raw score basis; the means of listening tests are within one raw score point from each other which is true also of reading tests. These tests were standardized in 1968 on a national sample in eight regions of the

United States, drawn proportionally according to population of each region based on the 1960 census. Authors report both corrected split-half and Kuder-Richardson reliability coefficients above .80.

The verbal and nonverbal batteries of Form A, Level 3 and Level 4 of the Lorge Thorndike Intelligence Test were used to assess the intelligence of the fifth grade subjects and the seventh grade subjects respectively.

With the exception of two subtests, Form A of the battery of tests constructed by Dr. Robert L. Schreiner for his doctoral dissertation at the University of Iowa in 1968 was used to appraise each subject's ability in various skills generally included under the rubric of reading comprehension (Schreiner, 1968). Omitted were the speed of reading subtest and the reading subtest of the Iowa Test of Basic Skills: neither skill was considered pertinent to this study which is focally concerned with the process of comprehension. This test includes the following subtests:

Speed of noting details
Listening comprehension
Paragraph meaning
Determining cause and effect
Reading for inferences
Selecting main ideas
Verbal reasoning
Iowa Test of Basic Skills--Vocabulary subtest

This battery is the most comprehensive for assessing reading comprehension known to this writer. The breakdown of reading comprehension into components, made possible by

these separate subtests, enables one to compute the relationship between proficiency in each of the above stated subareas of reading comprehension and data contained in each category of the Rorschach that was used. Schreiner drew items from well known standardized instruments, but did not standardize the instrument he developed. However, Schreiner constructed two forms of the instrument, A and B, and reported intertest reliabilities ranging from .55 through .85 from his administration of the instrument to 513 fifth grade school children in the State of Iowa. The format used in this study is identical to that appearing in Schreiner's dissertation. However, these subtests in Appendix B were done in single rather than double column because of type size. Scoring masks for the fifth grade level of the Iowa Test of Basic Skills (for machine scoring) were used for answers on all but two subtests.

The Rorschach Inkblot Test is an old, well known, and well established projective test. It is a controversial instrument, having been the focus of both much praise and much criticism since its introduction in 1922. Its low level of structure makes it difficult, if not impossible, to obtain data with the level of precision characteristic of psychometric instruments. However, the Rorschach categories of focal concern in this study are those of location and quality of form discrimination which are the most highly standardized categories. Determinants such as experience of movement and use of color are also among the more

respected facets of this instrument. This test was administered in accordance with the directions stated by Beck (1961) and was scored according to Beck's criteria, using his tables for determining quality of form.

Normative data concerning the Friedman scoring system of the Rorschach, in accord with which Rorschach protocols were subsequently scored, can be found in the in the literature (Goldfried, et. al. 1971). This data is open to criticism on some counts. With the exception of a study using this system to assess mental defectives, all samples were made up of only males. Some subgroups were small in number with restricted IQ ranges. However, Goldfried, et. al., quote a study that suggests that the developmental levels of girls and boys do not differ. These authors also refer to a study by Hemmendinger involving 160 boys ranging in age from three to 10 years, in which it was found that high W and D scores increased with age, and low W and low D scores decreased with age, although the progression was not a smooth one. The authors quote research done by Rosenblatt and Solomon who studied a group of 80 adult male and female mental defectives with no discernable evidence of organic impairment, ranging in mental age from 5.1 through 11.11. Their results indicated that defectives functioned at significantly lower levels of development on the Rorschach, scored according to Friedman criteria. Interscorer reliability has been found by Goldfried et. al., to be favorable. The authors quote

research by Friedman, et. al., indicating a mean agreement of 93.5 percent with two judges independently scoring subject's protocols, with a range of 89.4-96.0. A second study indicated a mean agreement of 93.6 percent with a range of 91.3-95.6 with three judges independently rating subject's protocols. A study suggesting lower reliability with 70 percent agreement, in which five scorers independently scored the protocols is also quoted. The authors attribute this difference, in a measure, to a possible lack of experience with this instrument; two of the scorers were M.D.'s, one was a B.A., and the remaining two were Ph.D.'s.

Subjects

The 60 subjects used in this study were drawn from the fifth and seventh grades of the Holland Public, Holland Christian, West Ottawa Public, Hamilton Public, and Allegan Public School Systems, all located in Western Michigan. The experimental groups consisted of 15 "poor" comprehending fifth grade students and an equal number of similar seventh grade students. The control groups consisted of 15 average or above average comprehending fifth grade students and an equal number of similar seventh grade students. Of the fifth grade experimental group, seven were students at Holland Public Schools, four at West Ottawa Public Schools, three at Holland Christian Schools, and one at Hamilton Public Schools. The fifth grade control group was made up of 12 students of Holland Christian Schools, two students of Holland Public

Schools, and one student of West Ottawa Public Schools. Included in the seventh grade experimental group were six students of Holland Public Schools, four students of West Ottawa Public Schools, four students of Allegan Public Schools, and one student of Holland Christian Schools. Included in the seventh grade control group were eight students of Holland Christian Schools, four students of Holland Public Schools, two students of West Ottawa Public Schools, and one student of Allegan Public Schools.

Data Collection

Standardized test data was used as a guide in selecting subjects where it was available. In addition, fifth grade teachers and seventh grade teachers of English or reading were requested to recommend students of at least normal intelligence, with adequate skill in word recognition, and exhibiting difficulties in comprehending what they read, i.e., the student who reads fluently but appears to comprehend and retain little of what he reads. This group of students was administered the Durrell Listening-Reading Series. Students retained in the control groups at this point were those who placed at the 50th percentile or above on both the Paragraph Listening and Paragraph Reading Comprehension Subtest of this scale. Those retained in the experimental groups included those who placed at the 25th percentile or below on

the same subtests. Table 3.1 shows the distribution of subjects in each group.

The above named subtests of the Durrell Listening-Reading Series were administered under public school conditions and in as controlled a situation as possible in busy junior high schools. Administration was done in small groups. Because of the limitations of time, the administration of the listening and reading subtests were not separated by a one week period of time as specified in the test manual. Administration also deviated from standard in that subtests were not in some instances administered completely in one sitting. In the opinion of the writer, the effect of these deviations on test data is insignificant.

Those students whose scores placed above the 50th percentile or below the 25th percentile on the Durrell Listening-Reading Series were given the Lorge Thorndike Intelligence Test. The verbal and nonverbal sections of Level 3, Form A were administered to fifth grade students, and the same sections of Level 4, Form A were administered to seventh grade students. The order in which verbal and nonverbal sections were administered was not invariant. In all but a few instances the tests were administered in small groups during the regular school schedule. Participation of students who failed to obtain an IQ score of at least 90 in either or both verbal and nonverbal sections of this instrument was

TABLE 3.1.--Durrell Listening-Reading Series Data

	Good Comprehenders			
	5th Grade		7th Grade	
	Durrell Listening	Durrell Reading	Durrell Listening	Durrell Reading
96 - 100*	1	1	5	1
91 - 95	3	2	2	1
86 - 90	4	2	3	1
81 - 85	3	3	1	1
76 - 80	1	2	2	
71 - 75				3
66 - 70	1	1		2
61 - 65				4
56 - 60	2	4	1	2
51 - 55				
46 - 50			1	
	Poor Comprehenders			
31 - 35				
26 - 30				
21 - 25	3	3	1	1
16 - 20	3	2	5	4
11 - 15	1	2	4	3
6 - 10	5	4	3	4
0 - 5	3	4	2	3

*Percentiles

terminated at this point. Lorge Thorndike data appear in Table 3.2.

In summary, all students retained at this point and included as subjects in the study possessed at least average intelligence, based upon their response to the Lorge Thorndike Intelligence Test, and were reported to possess adequate skill in word recognition. Those subjects who were placed in the experimental groups obtained scores falling at or below the 25th percentile of the Paragraph Listening and Paragraph Reading Subtests of the Durrell Listening-Reading Series (later in this study called poor comprehenders). Subjects who were placed in the control groups obtained scores falling at or above the 50th percentile on the above stated subtests of the Durrell Listening-Reading Series (later in the study called good comprehenders).

Subjects who met the criteria for inclusion in either control groups or experimental groups were administered the experimental battery of tests devised and used by Dr. Robert L. Schreiner for his doctoral dissertation in 1968. All subjects were also administered the Rorschach Inkblot Test.

The battery of tests developed by Schreiner was administered either individually or in small groups. Schedule problems at the junior high school level prevented the administration of this battery in one session and in some

TABLE 3.2.--Lorge Thorndike Intelligence Test Data

	5th Grade				7th Grade			
	Treatment		Control		Treatment		Control	
	Verbal	Non Verbal	Verbal	Non Verbal	Verbal	Non Verbal	Verbal	Non Verbal
146 - 150*			1					1
141 - 145			2	1				
136 - 140			4	2			1	1
131 - 135				4			1	1
126 - 130			1	4			1	2
121 - 125			4	3		1	2	2
116 - 120		1	2	1		1	3	3
111 - 115		5	1		1		3	2
106 - 110	1	2			4	3	1	3
101 - 105	5	3			1	5	2	
96 - 100	4				4	2		
90 - 95	1	4			3	3	1	
86 - 89	3				1			
81 - 85	1							
75 - 80					1			

*IQ Scores

instances prevented its administration under highly controlled conditions. In the opinion of the writer, this deviation was so slight that its effect is minimal.

The administration of the Rorschach Test was in all cases an individual one. In many cases this test was administered during school time; in other cases, an appointment was made at the convenience of the subject.

Statistical Treatment of the Data

The data acquired by this study were analyzed at Michigan State University by means of the Jeremy Finn computer program for the multivariate analysis of covariance.

The Durrell Listening-Reading Series was used as a criterion measure for comprehension skill. Therefore, data produced by this instrument was not entered in the analysis.

To conserve degrees of freedom, Lorge Thorndike data, which were also criterion measures for intelligence, were treated as covariates, and, as such, were not entered in the analysis.

A correlation matrix, including correlation coefficients for each combination of measures used, with the exception of the Durrell Listening-Reading Series and the Lorge Thorndike Verbal Scale, appears in Appendix A.

To handle the problem of unequal responses to the Rorschach Test, Rorschach data were converted to percentages and rounded off to the nearest whole percent. To do away

with extremely small numbers on the C Sum/F variable (use of color in relation to use of form in making a response) the data were coded by multiplying each subject's score by one thousand.

Sequence scores were devised in a manner similar to that of the Beck scoring system of the Rorschach. This system uses three categories; methodical, irregular, and confused. Largely by inspection, based upon consistency of approach reflected by the entire record, one of these classifications is assigned. To fit the data to computer analysis, the digits 1, 2, and 3 were used to designate the categories methodical, irregular, and confused respectively.

CHAPTER IV

ANALYSES OF DATA AND RESULTS

The analysis of the data pertaining to the integrative capability and word knowledge of good and poor comprehenders is presented in this chapter.

With the exception of the criterion measures of reading comprehension and verbal section of the criterion measure of intelligence, correlation coefficients were computed for each combination of measures that were used. This correlation matrix appears in Appendix A.

No significant interaction effects were identified as shown in Table 4.1. Therefore, significant differences reported can be attributed to the main effects, comprehension skill and grade placement.

Hypotheses

H1: Good comprehending fifth and seventh grade students will not produce significantly more W responses to the Rorschach Test than will poor comprehending fifth and seventh grade students (as previously defined). Poor comprehending students will not produce significantly more D responses to the Rorschach Test than will good comprehending fifth and seventh grade students.

The writer accepts the null hypothesis that good comprehenders will not produce more W responses to the

TABLE 4.1.--Interaction Effect
F - Ratio for Multivariate Test of Equality of Mean Vectors
D. F. = 15 and 41.0000 P Less Than 0.3908

	Variable	P Less Than
1.	Speed of Noting Details	0.6861
2.	Listening Comprehension	0.7263
3.	Paragraph Meaning	0.3995
4.	Determining Cause and Effect	0.8690
5.	Reading for Inferences	0.0485
6.	Selecting Main Ideas	0.1269
7.	Verbal Reasoning	0.4871
8.	Iowa Basic Vocabulary	0.5448
9.	Rorschach Total Response	0.1602
10.	Rorschach W	0.8538
11.	Rorschach D	0.1949
12.	Rorschach Sequence	0.1585
13.	Rorschach F + Percentage	0.3066
14.	Rorschach C Sum/F	0.0563
15.	Rorschach Experience Actual	0.0263

Rorschach than will poor comprehenders who in turn will not produce significantly more D responses to this instrument. According to the data presented in Table 4.2, differences in the W and D categories of the Rorschach are not significant at the .05 level. It would, therefore, appear that good comprehenders do not possess a greater ability to integrate details into a unity or form gestalten, then do poor comprehenders as assessed by the Rorschach Test.

H2: Good comprehending fifth and seventh grade students will not achieve significantly higher F+ percentages in response to the Rorschach Test than will poor comprehending fifth and seventh grade students.

The writer accepts this hypothesis that good comprehending fifth and seventh grade subjects will not achieve higher F+ percentages in response to the Rorschach Test than will poor comprehending fifth and seventh grade subjects. The data presented in Table 4.2 indicate that differences in the F+ category are not significant at the .05 level. According to standard interpretation of the Rorschach (Beck, 1961) good comprehending fifth and seventh grade students do not appear to perceive the real world with significantly greater accuracy than do poor comprehending fifth and seventh grade students.

H3: Good comprehending fifth and seventh grade subjects will not display a more flexible approach to Rorschach stimuli than will poor comprehending fifth and seventh grade students.

TABLE 4.2.--Comprehension Main Effect
F - Ratio for Multivariate Test of Equality of Mean Vectors
D. F. = 15 and 41.000 P Less than 0.0001

	Variable	P Less Than
1.	Speed of Noting Details	0.0002*
2.	Listening Comprehension	0.0001*
3.	Paragraph Meaning	0.0009*
4.	Determining Cause and Effect	0.0059*
5.	Reading for Inferences	0.0001*
6.	Selecting Main Ideas	0.0007*
7.	Verbal Reasoning	0.0005*
8.	Iowa Basic Vocabulary	0.0001*
9.	Rorschach Total Response	0.6953
10.	Rorschach W	0.5586
11.	Rorschach D	0.5852
12.	Rorschach Sequence	0.5087
13.	Rorschach F + Percentage	0.4607
14.	Rorschach C Sum/F	0.2255
15.	Rorschach Experience Actual	0.1013

*Significant at alpha < .05

The null hypothesis that good comprehending fifth and seventh grade subjects will not display greater flexibility in their approach to Rorschach stimuli than will poor comprehending fifth and seventh grade subjects is accepted. The data appearing in Table 4.2 indicate that differences in the sequence category of the Rorschach are not significant at the .05 level. It is possible that significance could have been demonstrated with a more refined measure of this variable. The writer concludes that students who earn high scores on measures of reading comprehension do not differ significantly in their perceptual approach from their peers who obtain lower scores on such measures.

H4: Good comprehending fifth and seventh grade subjects will not achieve significantly higher scores in response to the vocabulary subtest of the Iowa Test of Basic Skills than will poor comprehending fifth and seventh grade students.

The writer rejects this hypothesis that good comprehending fifth and seventh grade subjects will not produce significantly higher scores on the vocabulary subtest of the Iowa Test of Basic Skills than will poor comprehending fifth and seventh grade subjects. The data contained in Table 4.2 show that differences on the Iowa Basic Vocabulary Test and all subtests of the Schreiner battery of subtests are significant at the .05 level. It appears that knowledge of word meanings among good comprehenders is significantly greater than among poor comprehenders. Level of proficiency

with language in general can be inferred from response to tests of vocabulary. To the extent this inference is justified, one could infer that good comprehending fifth and good comprehending seventh grade students are more proficient with language than are their poorer comprehending peers. Support for this contention is also drawn from the fact that significant differences between good and poor comprehenders occurred on all subtests included in the Schreiner battery, which assesses proficiency in different subskills of reading comprehension.

Ancillary Information

Significant differences at the .05 level appear to exist in the W++ and D++ categories of the Friedman scoring system of the Rorschach, as shown in Table 4.3. It may be argued that the alpha level should be split as many ways as there are categories in this system, as the response of the same group of subjects is reflected by these categories. Should the alpha level be split, reported differences would not be significant. However, these are categories of the same test, involving only one set of responses per subject. Therefore, the writer believes that the splitting of the alpha level would not be defensible and that the differences reported above are significant.

Significant differences in the above stated categories of the Friedman scoring system of the Rorschach suggest

TABLE 4.3.--Friedman Scoring System of the Rorschach Comprehension Main Effect F - Ratio for Multivariate Test of Equality of Mean Vestors

Variable	P Less Than	
W++	0.0401*	P Less Than 0.1258**
W+	0.5342	
WM	0.6222	
WV	0.6840	P Less Than 0.8206**
WA	0.3217	
W-	0.8290	
DW	0.4944	
D++	0.0372	P Less Than 0.1825**
D+	0.4728	
DM	0.1057	
DV	0.2815	P Less Than 0.4654**
DA	0.4984	
D-	0.5780	
DDD	0.3601	

*Significant at alpha < .05
**Multivariate P

that although good comprehenders did not produce significantly more W and D responses, those they did produce were of higher quality and required a distinctly higher level of mental organization. This suggests that good comprehenders are more analytic and display a greater ability to organize and synthesize discrete details into wholes. The good comprehender may be one who reads slowly and analytically, focusing upon each and every detail in turn, rather than one who skims or reads rapidly, being satisfied with acquiring only a general idea of the content contained in the passages he reads.

Seventh grade subjects produced significantly more D responses (detail responses) than did fifth grade subjects, and achieved significantly higher scores on the measure of inferential comprehension, as can be seen in Table 4.6. This suggests a greater focal awareness of details with increased maturation as well as greater ability to draw appropriate inferences.

As will be noted in Appendix A, all correlations are comparatively low. A low correlation, 0.129 and 0.253, was noted between Rorschach total responses and verbal and non-verbal intelligence scores respectively. Total W responses, considered by Rorschach authorities as an indicator of intelligence, correlated negatively, -0.137 and -0.032, with verbal and nonverbal intelligence scores respectively.

TABLE 4.4.--Friedman Scoring System of the Rorschach Grade Main Effect
F - Ratio for Multivariate Test of Equality of Mean Vectors

Variable	P Less Than	
W++	0.9893	P Less Than 0.3936*
W +	0.1210	
WM	0.3779	
WV	0.4444	P Less Than 0.7475*
WA	0.3217	
W-	0.4909	
DW	0.8195	
D++	0.7988	P Less Than 0.8544*
D+	0.6563	
DM	0.5056	
DV	0.1527	P Less Than 0.1617*
DA	0.3846	
D-	0.2865	
DDD	0.1298	

*Multivariate P

TABLE 4.5--Friedman Scoring System of the Rorschach Interaction Effect
F - Ratio for Multivariate Test of Equality of Mean Vectors

Variables	P Less Than	
1. W++	0.6957	P Less Than 0.5220*
2. W+	0.1540	
3. WM	0.9430	
4. WV	0.4444	P Less Than 0.8380*
5. WA	0.3217	
6. W-	0.8620	
7. DW	0.9394	
8. D++	0.3100	P Less Than 0.6061*
9. D+	0.7065	
10. DM	0.2226	
11. DV	0.2643	P Less Than 0.7335*
12. DA	0.7713	
13. D-	0.8640	
14. DDD	0.3602	

*Multivariate P

TABLE 4.6.--Grade Main Effect
F - Ratio for Multivariate Test of Equality of Mean Vestors
D. F. = 15 and 41.0000 P Less Than 0.0434

	Variable	P Less Than
1.	Speed of Noting Details	0.1383
2.	Listening Comprehension	0.5760
3.	Paragraph Meaning	0.0769
4.	Determining Cause and Effect	0.9114
5.	Reading for Inferences	0.0009*
6.	Selecting Main Ideas	0.2697
7.	Verbal Reasoning	0.0770
8.	Iowa Basic Vocabulary	0.7722
9.	Rorschach Total Response	0.5248
10.	Rorschach W	0.3743
11.	Rorschach D	0.0494*
12.	Rorschach Sequence	0.9595
13.	Rorschach F + Percentage	0.0566
14.	Rorschach C Sum/F	0.5899
15.	Rorschach Experience Actual	0.3879

*Significant at alpha < .05

Higher correlations were noted between Rorschach F+ percentages and verbal and nonverbal intelligence scores, 0.337 and 0.219 respectively. It should be noted that reported correlations can be generalized to the type of population used in this study. These correlations cannot be legitimately generalized to a general population.

CHAPTER V

SUMMARY AND IMPLICATIONS

The procedures and findings of this study are summarized in this chapter. A discussion of the implications believed consistent with the findings follows the summary.

Summary

Thirty, fifth grade pupils and 30 seventh grade pupils were used as subjects. Each group of 30 pupils consisted of 15 pupils classified as poor comprehenders and 15 pupils classified as good comprehenders. The Durrell Listening-Reading Series was used as a criterion measure for classifying pupils either as good comprehenders or poor comprehenders. All subjects were administered a vocabulary test, a battery of differential measures of reading comprehension, and the Rorschach Inkblot Test. Rorschach protocols were initially scored by the Beck (1961) scoring system of the Rorschach. These same protocols were subsequently scored by the Friedman (1952) scoring system which refines the location category of the Beck system by reflecting the extent of differentiation and hierarchical integration suggested by the subject's responses.

The subjects classified as good comprehenders were found to achieve significantly higher scores than poor comprehenders on the vocabulary test and on the differential measures of comprehension. No significant differences were found between good and poor comprehenders on any of the categories of the Beck scoring system of the Rorschach used in this study. Good comprehenders, however, produced a significantly greater number of responses that fall within those categories of the Friedman system which suggest a high level of analysis and organization. Seventh grade subjects produced significantly more D responses (detail responses) to the Rorschach than did fifth grade subjects and achieved significantly higher scores on the subtest measuring inferential comprehension. The following implications are believed consistent with these findings.

Implications

The developmental theories of perception (Werner, 1948; Ames, et. al., 1953; and Hemmendinger, 1953) and, by implication, the hierarchical theories of reading comprehension receive some support from this study. As stated in Chapter IV, seventh grade subjects produced significantly more D responses (detail responses) than did fifth grade subjects. This is consistent with the findings of Ames, et. al., and Hemmendinger who discovered a trend toward increasingly more D responses (detail responses) with

succeeding age levels. The findings of the present study suggest that this trend continues beyond age 10, the upper limit of the age range studied by Ames, et. al., and more intensively by Hemmendinger. This suggests that with maturation, one's perceptions become more differentiated with greater awareness of details, which is consistent with Werner's theory which suggests that perceptual development proceeds from lesser to greater differentiation and hierarched integration. It is of interest to note that although the trend toward more detail responses appears to continue beyond age 10, only the good comprehenders exhibited evidence to suggest greater hierarchical integration. Seventh grade subjects also demonstrated greater ability to do inferential comprehension. This apparently greater ability of seventh grade pupils to draw appropriate inferences may in large measure be attributable to their more detailed perceptions which provide more differentiated and specific information upon which to draw inferences. They may also profit from a greater amount of background experience produced by two additional years of life. It seems reasonable to assume that one must rely on his experience when "reading beyond the lines" and drawing inferences. The study also supports those who espouse the hierarchical structure of reading comprehension to the extent that it supports developmental theories of perception and thought processes,

in the sense that a hierarchical arrangement of skills would presumably proceed from the comparatively more simple to the comparatively more complex and would relate to a developmental sequence of abilities which should do the same. Relevant to this issue is the work of Ames, et. al., (1950, 1953). Although Ilg and Ames studied younger children and were interested primarily in the development of word recognition skill, and although they did not specifically equate the two, they report finding a well patterned developmental sequence in childrens' response to the Rorschach and a similarly well patterned sequence, which they refer to as reading gradients, in the development of word recognition skill. Since Ilg and Ames found perceptual development and acquisition of word recognition skill to proceed according to a well patterned sequence, and in view of the fact that the findings of this study are consistent with those of Ilg and Ames in suggesting more detailed perception with increased maturation, with additional support from the finding that seventh grade subjects used in this study displayed significantly greater ability to draw inferences than did fifth grade subjects, it may be plausible to assume that reading comprehension is also developmental in nature.

The findings of this study strongly support the position that skill in reading comprehension is positively related to proficiency with language, and amount of background

experience, to the extent that background experience is reflected by vocabulary. This suggests that a well designed program for the development of language skills is suitable for developing general comprehension skill of regular students. The writer believes that materials designed to develop specific reading and thinking skills may be beneficial in instances. It would seem reasonable to assume that the student of at least average intelligence who possesses adequate word recognition skill, but even so comprehends poorly (i.e., at the fifth percentile of a standardized test of reading comprehension), is handicapped by one or a combination of potentially identifiable factors or deviations in his thought processes, and can be helped by a removal or remediation of these probable causative factors. However, it would also seem that a widespread use of such materials is not warranted at present. Further support for the notion that a general program for the development of language skills is sufficient for meeting the needs of the regular student in this area is drawn from the consistency with which good comprehenders achieved significantly higher scores on all differential measures of reading comprehension as well as on the vocabulary test. Data quoted by Betts (1956) suggest that those who do well in general comprehension tend to comprehend well in subjects such as social studies.

Good and poor comprehenders differed significantly in the level of differentiation and analysis of relatively small details. This finding does not support those who take the integrative approach and suggests that the use of devices such as formboards or the assembling of puzzles sometimes recommended for the building of synthesis or integrative skill, which involve relatively large areas, are not effective in developing skill in comprehension of regular students at the later elementary school and junior high school levels. However, such procedures may be effective relative to word recognition skill at earlier ages when problems with visual discrimination may exist, and with those who have been labelled as hyperactive or minimally brain damaged students.

Although difficult to assess, it would appear that good comprehenders tend to be more analytic, more willing and/or able to consider materials in detail than poor comprehenders. Their approach to problems and subject matter may be less impulsive and more contemplative with greater attention given to detail and an analysis of relationships between details with the result that more elaborate and meaningful concepts are formed. The writer is of the opinion that it would be well to encourage students experiencing difficulty comprehending what they read to read more slowly, thoughtfully, and to the extent this can be taught,

to reflect at greater length on what they read and more carefully consider implications and alternatives inherent in the content of what is read. Additional support for this contention is drawn from a study done 19 years ago (Sisson and Taulbee, 1955) which found a positive significant relationship between level of organization, as inferred from the response of high school students to the Rorschach Test, and proficiency in verbal reasoning based on response of the same subjects to the Primary Mental Abilities Test.

A practical question is raised by the findings of this study: under what circumstances should the Rorschach be administered relative to comprehension problems in a school setting where many students must be dealt with within limited periods of time? It is believed that this instrument may be helpful in instances in which one gets the impression that a student may be thinking in broad and shallow terms, apparently thinking largely in terms of obvious details and showing little evidence of relating details and integrating them into more meaningful wholes. Observing such a student respond to the Rorschach may enable one to get "a feel" for the extent of this problem. In view of the fact that no significant differences were found among good and poor comprehenders on any of the categories of the Beck scoring system of the Rorschach, the writer is of the

opinion that there is no demonstrable value in going through the time consuming process a complete scoring of this instrument often requires. It would appear that this instrument can be used more efficiently by evaluating a sampling of responses against the Friedman or similar criteria.

The review of the literature revealed that an appreciable number of writers in the field of reading considered a knowledge of language structure important for skill in reading comprehension. Accordingly, to the extent these writers are correct, it might be beneficial to include in the instructional program for the development of language skills a provision for developing the ability to use syntactical clues.

It appears plausible to assume that a knowledge of and the ability to use syntax in comprehending sentences and longer thought units requires a high level of organizational skill. Organization involves focal awareness of details, cognizing the relationships between details, and in accordance with these relationships, integrating the details into a unified concept. Comprehension involves knowledge of word meanings (details), in specific relationships of words to each other (organization), from which a complete idea is apprehended (integration). The significantly higher level of cerebral integration suggested by

the response of good comprehenders to the Rorschach Test, as scored by the Friedman system, provides support for this view.

APPENDIX A

SAMPLE CORRELATION MATRIX (WITHIN CELLS)

SAMPLE CORRELATION MATRIX--(WITHIN CELLS)

	1 NONVBL	2 TEST V	3 TEST R	4 TEST L1	5 TEST L2	6 TEST L3	7 TEST X	8 TEST Y	9 IOWABV	10 RTOTAL
1 NONVBL	1.000000									
2 TEST V	0.222280	1.000000								
3 TEST R	0.329601	0.030339	1.000000							
4 TEST L1	0.413772	0.194520	0.109149	1.000000						
5 TEST L2	0.236648	0.100106	0.167493	0.208733	1.000000					
6 TEST L3	0.419973	0.105353	0.276364	0.515089	0.371474	1.000000				
7 TEST X	0.460823	-0.138826	0.228416	0.358879	0.142311	0.460991	1.000000			
8 TEST Y	0.289196	0.108662	0.077573	0.212596	0.280327	0.239846	0.255859	1.000000		
9 IOWABV	0.579580	0.233624	0.052738	0.559453	0.318701	0.400168	0.409069	0.410100	1.000000	
10 RTOTAL	0.253175	0.085292	0.223936	0.235691	0.264038	0.342425	0.087931	0.117172	0.175114	1.000000
11 W	-0.032707	0.043297	0.060999	0.043239	-0.184820	-0.116363	0.013888	-0.102498	-0.078508	-0.432385
12 D	-0.075322	0.065501	-0.162162	-0.080606	0.234601	-0.037335	-0.080106	0.138838	0.155130	-0.001043
13 SEQ.	0.284483	0.106673	0.219949	0.176382	0.200545	0.208478	0.094409	0.008313	0.139958	0.707075
14 F+	0.218821	0.264093	-0.160458	0.149638	0.184651	0.121732	0.067871	0.335388	0.415274	-0.282001
15 C SUMF	-0.185267	0.143737	0.089364	0.041446	1.146703	-0.010387	-0.069719	-0.089511	-0.054996	-0.045568
16 EA	-0.047151	0.140885	0.042212	0.120751	0.232256	-0.022896	0.004941	0.027145	0.068827	0.247049

	11	12	13	F+ 14	15 C SUMF	EA 16
11 W	1.000000					
12 D	-0.585013	1.000000				
13 SEQ.	-0.137993	-0.302149	1.000000			
14 F+	-0.080632	0.345797	-0.146553	1.000000		
15 C SUMF	0.176717	0.044007	0.006223	0.018899	1.000000	
16 EA	0.111164	0.034751	0.199815	-0.035774	0.666928	1.000000

APPENDIX B

TESTS

TEST V: SPEED OF NOTING DETAILS

FORM A

DIRECTIONS: Read each of the following paragraphs. Below each one will be some questions. Select the number of the one word or phrase that best answers each question and mark that number on the answer sheet. Put your answers for this test in TEST V on the answer sheet. Begin at number 24.

The cowboys were not the only ones on the ranch. There was Mike the head wrangler, who was the foreman, and old Pete who fixed things around the bunkhouse. Then there was Rusty, the cook, who was in charge of the chuck wagon. What a supper he prepared--broiled steak, baked potatoes, hot biscuits, steaming coffee, fresh apple pie! And were those cowboys hungry! That day they had ridden thirty miles through rough country.

24. How many men lived on the ranch besides the cowboys?

1) one
2) two
3) three
4) The story does not tell.

25. Rusty's chief responsibility was

1) the head wrangler
2) fixing things
3) the cowboys
4) the chuck wagon

26. Which of the following was not included in the cook's supper:

1) cherry pie
2) potatoes
3) biscuits
4) steak

27. How many miles had the cowboys ridden that day?

1) 20
2) 30
3) 50
4) The story does not tell.

In a little town in Mexico, the only transportation is an open-air trolley pulled by a burro. For a few cents, you can ride through the town, a distance of two miles, in about fifteen minutes. The trolley makes no stops for passengers. The burro just keeps moving along so slowly that anyone can hop on or off the trolley without getting hurt.

28. What makes the trolley move through the town?

1) a horse
2) an engine
3) a donkey
4) a cable

29. How long does a complete trip through the town take?

1) a few minutes
2) two minutes
3) fifteen minutes
4) The story does not tell.

30. How many stops does the trolley make?

1) none
2) one
3) two
4) fifteen

31. A trip on this trolley costs a few

1) dollars
2) pennies
3) dimes
4) nickles

Ships that carry oil cargoes are called tankers. They are actually floating oil tanks. When filled with oil, they ride so low in the water that the sea washes over their decks. For this reason, on almost all tankers the living quarters for the crew are at the rear, on the afterdeck. There are also tankers that carry molasses and other liquids.

32. Which country in the world has the largest fleet of tankers?

1) Russia
2) United States
3) Japan
4) The story does not tell.

33. Which of the following was <u>not</u> mentioned as being carried by tankers?

1) molasses
2) liquids
3) coal
4) oil

34. Crews live in which part of the tankers?

1) front
2) back
3) high
4) low

35. The ship rides low when it is

1) stopped
2) full
3) light
4) moving

Around 1850, steamboats provided an important means of transportation from one part of our country to another. On the big rivers it was the steamboats all the way. Never had men traveled in such comfort as they did in those fast flat-bottomed boats, with their three or four decks. The rows of heavy seats had red cushions that were deep and soft.

36. When were steamboats in the U.S. an important means of transportation?

1) 19th century
2) 20th century
3) 18th century
4) 17th century

37. The bottoms of these steamboats were

1) rounded
2) pointed
3) flat
4) arched

38. How many decks did these boats have?

1) 1 or 2
2) 3 or 4
3) 10 or more
4) The story does not tell.

Bacon is a valuable energy food. Meat that is used for bacon is trimmed and put in a mixture of salt, sugar, and a small amount of sodium nitrate. In the curing process, salt preserves the bacon. Sugar makes the meat more agreeable to the taste. The nitrate helps to preserve the color of the meat. Curing requires from 20 to 30 days. After curing, the bacon is smoked over a hardwood fire to give it a better flavor.

39. Salt is used in bacon for

1) improving its looks
2) preserving the color
3) flavor
4) preventing spoilage

40. The process of curing bacon requires about

1) one week
2) two weeks
3) many months
4) three or four weeks

41. Sodium nitrate helps bacon keep its

1) color
2) taste
3) flavor
4) texture

42. Pork is smoked to

1) maintain its color
2) improve the taste
3) eliminate spoilage
4) reduce its cost.

Bobsledding is a fast, dangerous sport in which two-man or four-man teams careen down steep, icy mountain slopes on heavy steel sleds at speeds up to ninety mph. On the two-seater, one man steers and the other man brakes by grinding steel teeth into the ice. The two center men on the four-seat sled provide extra stability. They must also bob, or lie back and then raise and lower their bodies in unison to give extra momentum. Two-man sleds are 9 feet long and weigh about 350 pounds, while four-man sleds weigh nearly 500 pounds and are 11 feet, 7 inches long.

43. Sometimes bobsleds travel up to _____ miles per hour.

1) 70
2) 80
3) 90
4) 100

44. Bobsleds are made of

1) aluminum
2) wood
3) metal
4) hard-rubber

45. Four-man bobsleds are nearly _____ feet long.

1) fourteen
2) twelve
3) nine
4) eight

46. The term bobbing refers to

1) moving together for extra speed
2) braking
3) steering in unison
4) lying down on a bobsled

47. The extra men on a four-man sled

1) help give extra speed
2) help to steer
3) are needed for braking
4) make the sled less stable

The calendar of the very early Romans had ten months instead of twelve. March was the first month of the year. It was named for Mars, the Roman god of war. October, November, and December got their names because they were the eighth, ninth, and tenth months. The Latin words for "eight," "nine," and "ten" are "octo," "novem," and "decem."

48. How many months did the early Roman calendar have?

1) 14
2) 12
3) 11
4) 10

49. The month of March was named in honor of

1) the early Romans
2) the god of war
3) the Marquis de Sade
4) Latin

50. "Octo" means "eight" in what language?

1) Latin
2) Greek
3) Egyptian
4) Italian

51. The 10th month on the Roman calendar was

1) March
2) November
3) December
4) October

STOP, WAIT FOR FURTHER DIRECTIONS.

Pages 85-91 as well as the Verbal Reasoning subtest are omitted from this dissertation as publisher's permission to reproduce items of these subtests in this form was not granted.

For the text of the subtests, the reader is referred to: Robert L. Schreiner, "A Study of Interrelationships Among Different Approaches to Measuring Reading Comprehension" (unpublished Ph.D. dissertation University of Iowa, 1968), Ann Arbor, Michigan: University Microfilms, Inc., 1970.

TEST L-1: PARAGRAPH MEANING

FORM A

DIRECTIONS: Read each paragraph below. Some words have been omitted from the sentences in the paragraphs. Look below each paragraph and pick one of the words or phrases that best fits in the blank space in the sentence. Record the number of the word or phrase you have chosen on the separate answer sheet. Put your answers for this test in TEST L-1 on the answer sheet. Begin at number 24.

If it were not for their coats of white fur, polar bears would easily be seen by hunters. As it is, they look so much like the surrounding (24) that hunters often do not see them until they (25).

24. 1) snow 3) dirt 5) water
2) coal 4) sugar

25. 1) aren't 3) hide 5) move
2) melt 4) aim

Peter is quite unlike his brother Sam. While Sam is industrious and rather bright, Peter is often very (26) and at times seems to be somewhat (27).

26. 1) tardy 3) prompt
2) busy 4) lazy

27. 1) sharp 3) mean
2) dull 4) cheerful

There are four basic blood types: A, B, AB, and O. People with type O blood can donate blood to anyone. Persons with other blood types can donate only to people of their own type. Thus, a person with AB type blood could donate blood only to a person of type (28). But he could receive blood from people with type (29).

28. 1) A 3) AB
2) B 4) O

29. 1) AB or A 3) AB or O
2) A or B 4) AB or B

The Egyptian sculptor seemed to represent moving figures only under protest; he disliked to show the zest and energy of (30) and powerful muscles in play. He smoothed down the figures of his great kings and gods and was happiest when the (31) he carved seemed like masks.

30. 1) motion 3) color
2) sound 4) light

31. 1) jewelry 3) bodies
2) faces 4) muscles

A lazy neighbor has taken very poor care of his house and yard. In spite of the general increase in the cost of real estate, I am sure the (32) of his has (33).

32. 1) size 3) value
2) maintenance 4) looks

33. 1) varied 3) stayed the same
2) gone down 4) improved

Speed was necessary, and Fred had tried to find a short cut through the forest. Now he knew that his (34) had not been a good one. He was (35). More time than he could have saved would now be (36) trying to get his bearings.

34. 1) safe 3) decision 5) speed
2) time 4) purchase

35. 1) last 3) asleep 5) lost
2) large 4) torn

36. 1) spent 3) saved 5) sent
2) locked 4) clocked

Seldom has a country been more inappropriately named than Greenland. Except for a narrow strip around its southern coast, it is a land buried under a cap of (37), which never goes away. Greenland might better have been called (38).

37. 1) tundra 3) soil
2) ice 4) trees

38. 1) Treeland 3) Vineland
2) Darkland 4) Iceland

The first powered flight by man occurred at Kitty Hawk, North Carolina, on December 17, 1903. Wilbur and Orville Wright, two brothers, were able to achieve only a short 120-foot (39), but this event marked the beginning of the era of (40).

39. 1) flight 3) wing
2) field 4) landing

40. 1) transportation 3) North Carolina
2) aviation 4) the Wrights

The Lincoln cent, first minted in 1909, was the first cent to bear the (41) of an actual person. In 1959, the reverse side of the Lincoln cent was (42). The wheat heads were (43) by a front view of the Lincoln Memorial, situated in Washington, D.C.

41. 1) likeness 3) back 5) thumbprint
2) brunt 4) imagination

42. 1) covered 3) redesigned 5) generated
2) massed 4) blotted

43. 1) registered 3) reached 5) replaced
2) reversed 4) published

In ordinary (44), the qualities of the speaker's voice give important clues to his thoughts and feelings. But when you read someone else's written work, you must study the (45) carefully so that you can interpret the (46) thought and feelings.

44. 1) textbooks 3) feelings 5) material
2) thinking 4) conversation

45. 1) dictionary 3) letters 5) spelling
2) text 4) syllables

46. 1) writer's 3) listener's 5) associations
2) common 4) enthusiastic

Tomorrow the circus moves on. As the spectators are enjoying the last performances, preparations for moving are already under way. As each act finishes, (47) pack their trunks. Roustabouts, who do much of the moving, pack equipment. Everything is done efficiently, and soon after the last (48) has gone home, the big (49) is on the road again.

47. 1) audiences 3) spectators 5) pageants
2) perfumes 4) performers

48. 1) circus 3) spectator 5) flight
2) curtain 4) equipment

49. 1) tops 3) gravel 5) name
2) show 4) pavement

STOP, WAIT FOR FURTHER DIRECTIONS.

TEST L-3: DETERMINING CAUSE AND EFFECT

FORM A

DIRECTIONS: Read each of the following sentences. Pick one of the four statements below the sentence that makes the most sense and best completes it. Put your answers for this test in TEST L-3. Begin at number 19.

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19. Many people will not buy land until it has been surveyed because:

    1) they want the boundaries to be correct.
    2) measuring land is a tedious job.
    3) they think it reduces taxes.
    4) surveyors use special tools for their work.

20. Most of the cotton used in this country is grown in the southern states because:

    1) there are many large farms in the South.
    2) cotton requires a long growing season.
    3) most cotton factories are in the South.
    4) cotton seeds are plentiful in the South.

21. Citizens like to have a hospital in their community because:

    1) it provides employment for many people.
    2) doctors and nurses usually live near the hospital.
    3) hospitals are a sign of a wealthy community.
    4) the ill and injured may be taken care of quickly.

22. Many people from the northern states take winter vacations in the South because:

    1) lots of their friends vacation there.
    2) there are few interesting sights in the North.
    3) they want to escape the harsh weather.
    4) vacations are expensive in the North.

23. Freezing temperatures do not often bother animals of the northern regions because:

    1) their coats change color with the season.
    2) they adapt to the weather changes.
    3) they bury themselves under the snow.
    4) they are born there.

24. Frozen foods are popular with housewives because:

1) they taste better than fresh produce.
2) they are easier to store and mass produce.
3) they save a great deal of preparation time.
4) they contain more vitamins and minerals than fresh foods.

25. Paperback books are less expensive than hard back books because:

1) they are printed on cheap materials.
2) they are mass-produced.
3) book stores sell more of them.
4) authors prefer to write for paperback book companies.

26. Shopping centers are often more popular places to shop in cities than downtown stores because:

1) plenty of parking is available.
2) prices are lower.
3) there is a wider selection of goods.
4) they are located on public transportation lines.

27. The population of rural areas compared to cities is reducing because:

1) fewer people seem to enjoy farming.
2) living on a farm is hard work.
3) young people seem less interested in rural living.
4) young people are moving to cities for better opportunities.

28. The Far West seems to be the fastest growing area in the United States because:

1) of more undeveloped land area than other parts of the country.
2) older people go there for health reasons.
3) job opportunities are greater there.
4) tourist accommodations are the best in the country.

STOP, WAIT FOR FURTHER DIRECTIONS.

TEST L-4: READING FOR INFERENCES

FORM A

DIRECTIONS: Read each of the paragraphs below. One word or phrase has been omitted at the end of the last sentence in the paragraph. Pick an answer from the four listed below each paragraph that best completes the sentence and makes the most sense. Put the number of the answer you have picked on the answer sheet. Put your answers for this test in TEST L-4. Begin at number 23.

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23. The little Indian boy made a pony out of red clay. He took the little pony to the river and placed its nose in the water; later he placed some hay in front of the pony. He took the same kind of care of it as he would have of

    1) his brother.
    2) any animal.
    3) a real pony.
    4) a puppy.

24. The fire tower is very tall. High above the tops of the trees is the lookout, which has many windows. From here the ranger can look in all directions and see everything for miles, as if he were in a

    1) fire.
    2) plane.
    3) train.
    4) window.

25. Young raccoons are well protected from their natural enemies as long as they are close to their mother. She is a large and very strong defender. The female parent of the raccoon family takes full responsibility for the protecting and raising of the children without any help from the

    1) trappers.
    2) farmers.
    3) children.
    4) father.

26. The hungry cougar steals silently through the forest in his quest for

    1) food.
    2) enemies.
    3) cougars.
    4) people.

27. It has been said of a certain state that its greatest asset is the intelligence and skill of its inhabitants. The state's most important possession is its

    1) literature.
    2) intelligence.
    3) people.
    4) tax payers.

28. Nothing like this had happened before. Mr. Burt thought for a long time before he decided upon the best thing to do in this situation in which he had no

1) experience.
2) help.
3) money.
4) friends.

29. The horse leaped a fence and landed in a pile of barbed wire, but she cleverly managed to free herself. One at a time, she lifted her hoofs clear of the wire and put them down

1) in more wire.
2) in clear spaces.
3) ten feet away.
4) on top of one another.

30. On their walls some stores have signs which say, "The customer is always right." Clerks in these stores are expected never to

1) make many sales.
2) enjoy their work.
3) argue with customers.
4) fight among themselves.

31. The man who installed the new equipment in the executive's office told him that the first cost would be the last, for the equipment was built to

1) make repairs easy.
2) last a lifetime.
3) match the old in service.
4) increase employee efficiency.

32. The town was plastered with campaign posters. Tonight all of the candidates will speak at a rally. Tomorrow will be

1) election day.
2) the Fourth of July.
3) Saturday.
4) Labor Day.

33. No fragments of pottery have been unearthed from the ruins of this city by archaeologists. Apparently its inhabitants did not know how to

1) cook food.
2) raise crops.
3) make earthen dishes.
4) build fires.

34. He worked with his hat on. Every editor has to cope with a certain number of wound-up visitors, and rumor has it that Max wore his hat to give these long talkers the impression that he

1) had just come in from breakfast.
2) was about to leave for an appointment.
3) would accompany them to lunch.
4) wanted to be courteous.

35. Certain neighborhoods have acquired bad reputations because some of the people living there have little respect for the law and are always ready and willing to

1) enforce it.
2) respect it.
3) revise it.
4) violate it.

36. A child may have the hair color of his mother and the eye color of his father, and thus show traits of both

1) parents.
2) features.
3) sexes.
4) colors.

37. We cannot classify the mink as either a day or a night animal. Generally he retires after a successful hunt, well fed and content. Later, when he awakens, he sets out again, indifferent to the

1) dangers.
2) season.
3) time.
4) weather.

38. They were surprised when Jones confessed to the theft, because, whatever his other shortcomings, no one had questioned his

1) accuracy.
2) ability.
3) honesty.
4) courage.

STOP, WAIT FOR FURTHER DIRECTIONS.

TEST X: SELECTING MAIN IDEAS

FORM A

DIRECTIONS: Each of the following paragraphs contains five sentences. One of the five sentences best expresses the main idea of the paragraph. Read each paragraph and select the numbered sentence that you think best represents the main idea. Put the number of the sentence you have chosen on the separate answer sheet. Begin with TEST X, at number 1.

---

1. (1) Treasure Island is a tale of adventure. (2) Most children like stories about adventure. (3) They always like the stories about Robin Hood. (4) Huckleberry Finn also had many adventures. (5) Hiawatha is another great favorite among children.

2. (1) Some people have strange ideas. (2) One man I knew thought blackberries were always black. (3) Another had a difficult time figuring out how a leafless tree could exist. (4) Still another believed the world to be flat. (5) Some people thought man would never fly in outer-space.

3. (1) During an epidemic of flu people who feel ill should see a doctor. (2) They should avoid crowded places. (3) Anyone who has to cough or sneeze should use a handkerchief. (4) Otherwise, he may infect others. (5) While an epidemic lasts everyone should be careful of his own health and the health of others.

4. (1) Some of the children were out skating. (2) Others were skiing. (3) Everyone enjoyed some kind of sport during the winter. (4) Many adults went sledding. (5) Men sometimes had snowshoe races through the woods.

5. (1) Susan got a mark of 78 in arithmetic on her last report card. (2) In geography she got 90. (3) She had 80 in reading, but her mark in spelling was only 52. (4) The average of all her marks was 75. (5) Susan did much better in some subjects than in others.

6. (1) There was a grinding of brakes. (2) A horn sounded loudly and then came the sound of a crash. (3) Soon a large crowd gathered. (4) It was a very bad accident. (5) One car lay on its side in the ditch.

7. (1) Christmas morning had come! (2) The children woke up early. (3) First Robert climbed out of his bed, then Jane, and soon Dorothy was toddling after them. (4) There was great excitement as they hurried down the stairs. (5) All of the children were pleased with their presents.

8. (1) Children need to be strong to play games. (2) Every child needs good health. (3) They have to be well or they can't go to school. (4) When children are sick they are unhappy. (5) They also miss a good deal of work in school.

9. (1) On Halloween children like to dress-up in costumes. (2) They travel in groups around the neighborhood and ask for tricks or treats. (3) They like to make ghostly faces on jack-O-lanterns. (4) Halloween is a night of witches, goblins, and mystery. (5) Often they get to stay out later than usual.

10. (1) When valleys are first formed, they are narrow and deep. (2) After a while they become wider through the constant erosion of their sides. (3) Erosion can become a serious problem. (4) The stream in a valley gradually deposits soil, thus building up the bottom of the valley. (5) It is possible to recognize the comparative age of a valley from its shape.

11. (1) There were shouts and cries of happy children everywhere. (2) The boys were playing baseball and the girls were playing skip rope. (3) Vacation was here at last! (4) They had three whole months to play. (5) There wouldn't be any school either.

12. (1) See that large black cloud in the west! (2) That means that a big storm is coming this way. (3) One can often look at the clouds and predict a change in the weather. (4) Yesterday there were little white clouds in the sky, spread out like feathers. (5) Such clouds mean bright sunny weather.

13. (1) Life on a farm is always busy and interesting. (2) There are many animals on a farm. (3) The farmer gets up early in the morning to feed them. (4) Then he works in the fields where he raises crops. (5) At night many farmers milk and feed cows.

14. (1) The room was quiet. (2) It was an ideal room for study. (3) There were three windows which permitted sufficient fresh air and light to enter. (4) A desk, with a lamp on top of it, was located near a window. (5) On the shelves were many books.

15. (1) Children sometimes have poor vision. (2) Other children are not well nourished. (3) A large proportion of the children in school have infected tonsils. (4) All of these conditions can be remedied.

16. (1) An Indian boy learned to run long distances and make himself strong. (2) He had to go without food to develop self-control. (3) He had to let others beat him so that he might learn to suffer in silence. (4) The Indians admired courage and endurance above everything else. (5) However, the men often required the women to do all the field work.

STOP, WAIT FOR FURTHER DIRECTIONS.

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