AN EMPIRICAL STUDY OF THE ROLE OF NONVISUAL INFORMATION IN THE READING PROCESS

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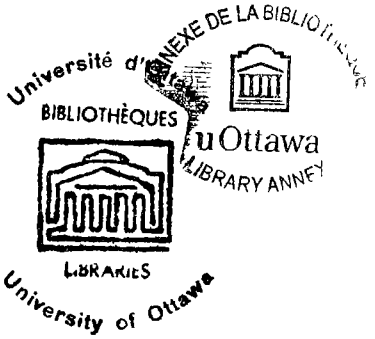

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CURRICULUM STUDIORUM

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INTRODUCTION

For many students, reading presents a problem. Teachers and students, alike, have recognized the implication of the students' being unable to read. Indeed, by far the largest proportion of literature in education has been directed toward the plight of the student who experiences difficulties in reading.

Invariably, the solution seems to be seen in terms of improving methods of instruction, methods which frequently take the form of reading laboratories, speed reading courses, controlled readers, remedial reading classes, etc. This is not to say, that some of these methods have not enjoyed some measure of success in helping the student to derive more information from the printed page; however, it may be that the solution has been misdirected. Frequently, in their zeal to develop new and efficient methods, educators have overlooked the intellectual resources of the student, resources which encompass all that the individual brings with him to a reading encounter, his expectations, his needs, his abilities and his existing knowledge.

Reading problems, alone, are sufficient to cause alarm among members of the teaching profession, but, to add to their burden, a host of other academic ills have

been associated with the problem of reading, the foremost of which has been poor general academic performance. It has been the practice of educators to attribute poor scholastic success to students' inability to read effectively; however, it may be that this represents a misunderstanding of the nature of reading and of reading disability. In fact, the reverse situation may be true; the majority of cases of reading inability may find their origin in students' poor academic competence. To express this concept more simply: teachers have traditionally assumed that, "Johnny does poorly in history because he can't read". The converse may, indeed, be true: "Johnny can't read because he does poorly in history". The problem with Johnny may be that he can't read because he brings few intellectual resources, by way of historical knowledge, to the reading encounter.

The purpose of this study will be to examine this postulate in relation to the teaching of reading at the secondary school level.

The hypothesis is inspired by Dr. Frank Smith of the Ontario Institute for Studies in Education who advocates that success in reading is more a function of what the reader brings to the page, than what he takes from the page. Smith's theory provides some insight into the problem of why Johnny can't read.

This thesis investigates Smith's major premise. Chapter I provides the theoretical background essential to the understanding of the present research project. Smith's psycholinguistic theory of reading is outlined and a statement on the tentative theoretical expectation is provided. Chapter II reviews the related literature supporting Smith's position. The chapter concludes with a summary and statement of the specific problem and hypothesis. Chapter III presents the experimental design and data analysis. Chapter IV provides the discussion of the results and suggestions are provided for further research. The thesis concludes with a summary of the findings and a discussion is provided on the psycho-pedagogical and curricular implications.

CHAPTER I

THEORETICAL RATIONALE

This chapter provides the theoretical rationale essential to the understanding of the present research project. Included in this chapter is a description of the major premise of Smith's theory, that is, the importance nonvisual information plays in the reading process. The chapter continues with an elaboration of the theory and concludes with a statement of the tentative theoretical expectation.

1. Smith's Theory of Reading

Smith assumed that:

> Prior knowledge of the world contributes more information to reading than the visual symbols on the printed page. That is, the skilled reader is one who possesses more nonvisual information than the less fluent reader who relies on more visual information.[1]

Smith's description of the visual process implies that information which passes from the brain to the eye is more important in reading that information that passes from the eye to the brain. That is, the eye perceives what the brain anticipates.

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1 Frank Smith, Understanding Reading, A Psycholinguistic Analysis of Reading and Learning to Read, New York, Holt, Rinehart and Winston, Inc., 1971, p. 3.

Thus Smith emphasized two major points:

1) Reading should not be regarded primarily as a visual process. That is, the information contributed by the brain to the eye is greater than the information the brain receives from the eye.

2) The eye functions according to the precise instructions from the brain.[2]

Smith's thesis that reading is a great deal more than simply a visual process, is supported by Arthur Gates who stated:

> Reading is not a simple mechanical skill, nor is it a narrow scholastic tool. Properly cultivated, it is essentially a thoughtful process. However, to say that reading is a "thought-getting" process is to give it too restricted a description. It can and should embrace all types of thinking, evaluating, judging, imagining, reasoning and problem solving.[3]

In context with the definition that reading is a "thinking process", Smith identified two types of information vital to the reading process: 1) visual information

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2 Ibid., p. 9.

3 Arthur I. Gates, "Character and Purposes of the Yearbook: Reading in the Elementary School", Forty-Eighth Yearbook of the National Society for the Study of Education, Part II, Chicago Press, 1949, as quoted by Russell G. Stauffer, Teaching Reading as a Thinking Process, New York, Harper and Row, 1969, p. 9.

and 2) nonvisual information. Visual information is defined as: "information which comes from in front of the eyeball, from the printed page."[4] Nonvisual information is defined as:

> information that derives from behind the eyeball, from the brain. It is what the reader already knows about reading, about language and about the world in general. It is the prior knowledge which the reader brings to the visual task of reading.[5]

In reading, there is a trade-off between visual and nonvisual information. That is, the more nonvisual information which is already possessed by the reader, the less visual information is required to identify a letter, a word or a meaning. Conversely, the less nonvisual information that can be drawn upon, the more difficult comprehension will be.[6]

Nonvisual information is of critical importance in the reading process. According to Smith, the reader who concentrates on identifying every word correctly will be unable to read for meaning. Meaning or comprehension must preceed word identification.[7] Nonvisual sources of

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4 Frank Smith, Psycholinguistics and Reading, New York, Holt, Rinehart and Winston, Inc., 1973, p. 6.

5 Ibid., p. 6.

6 Ibid., p. 7.

7 Ibid., p. 7.

information provide the reader with the tools to attach meaning to words. Fluent and effective reading will result, if the reader has had advanced knowledge of what is to be read.[8] This advanced knowledge will enable him to predict what is to come.

What Smith is saying is not new. The idea that "reading is bringing meaning to and taking meaning from the printed page", has been supported by many other reading theorists[9,10,11,12]. The reader may derive satisfaction from mastering the printed code, but this may simply be word calling unless he brings meaning to the printed material. Recall and utilization of this material can be transferred to subsequent reading experiences. The reader is not only reading on the lines but between and

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8 F. Smith, Understanding Reading, op. cit., p. 35.

9 Edmund Burke Huey, The Psychology and Pedagogy of Reading, Cambridge, Massachusetts, The M.I.T. Press, 1968, p. xxv.

10 Henry Smith and Emerald Dechant, Psychology in Teaching Reading, Englewood Cliffs, New Jersey, Prentice Hall Inc., 1965, p. 22.

11 Leland Jacobs, "Humanism in Teaching Reading", in Phi Delta Kappa, Vol. 52, No. 8, April 1971, p. 245.

12 Paul A. Kolers, "Reading is Only Incidentally Visual", in K. Goodman and J. Fleming (eds.), Psycholinguistics and the Teaching of Reading, Delaware, International Reading Association, 1969, p. 8.

beyond the lines.[13]

Smith wrote that all information acquisition in reading, from letter or word identification, to comprehension of passages can be regarded as the "reduction of uncertainty".[14] The skilled reader utilizes redundancy of information from many sources so that knowledge of the world and of language will reduce the need for visual information from the printed page.[15] Simply stated, comprehension, as operationally defined by Smith, is the reduction of uncertainty.[16] The reader who has comprehended a message, has had a certain set of alternatives reduced.[17] The elimination of alternatives by information from nonvisual sources, facilitates reading.[18]

To summarize the importance of nonvisual information in reading, Smith places emphasis on two major themes:

1) Only a small part of the information necessary for reading comprehension comes from the printed page. (The importance of nonvisual sources of information, in the reading process,is stressed)

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13 L. Jacobs, op. cit., p. 245.

14 F. Smith, Understanding Reading, op. cit., p. 35.

15 Ibid., p. 12.

16 F. Smith, Psycholinguistics and Reading, op. cit., p. 64-65.

17 F. Smith, Understanding Reading, op. cit., p. 35.

18 Ibid., p. 201, p. 35.

2) Comprehension must precede the identification of individual words (reading is not primarily visual)[19]

Implicit in Smith's theory is one area of consideration for both the educator and the researcher. As a prime consideration, one would expect to find marked differences in reading comprehension between students who possess a greater amount of nonvisual information as opposed to those who possess a lesser amount of nonvisual information. This research is designed to determine to what degree this expectation holds true in actual practice.

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19 F. Smith, Psycholinguistics and Reading, op. cit., p. 8.

CHAPTER II

STATUS OF THE INVESTIGATION: A REVIEW OF RELATED LITERATURE

This chapter will present a review of selected studies. The review will examine the relationship between three aspects of the reading process: 1) Reading and Non-visual Information; 2) Reading and Comprehension; 3) Reading and the Cognitivists.

The studies examined in the review of the literature relate to and support Smith's major thesis. The literature reveals the need for investigation in the area of secondary school reading. The problem and hypothesis of the present study which were conceived in response to this need, are then stated in the final section of the chapter.

1. Reading and Nonvisual Information

The literature reveals support for Smith's major premise, that prior knowledge of the world, of language and of reading, contributes more to reading comprehension, than the visual symbols on a printed page. That is, the marks on a printed page are relatively less important than the knowledge that a reader has before he even opens a book.

In this theory of reading which is evolving, reading is seen as information processing. The reader, uses his knowledge of language and his past experiences, to interact

with the graphic symbols on a page. In so doing, he seeks to reconstruct the writer's message. By concentrating on his total prior experiences, the concepts he has attained and his language competence, he is able to bring meaning to the visual task of reading.

Goodman[1] has advocated that reading is not reading unless there is some degree of comprehension. The reader brings to bear three important things in the reading process: 1) knowledge of language, 2) past experience, 3) conceptual attainment to decode written language.

A reader extracts meaning from the environment on the basis of what he sees (visual information) and what he knows (nonvisual information). Thus, in reading, the reader makes use of two aspects or levels of language: 1) its physical manifestation (i.e., the printed symbols or surface structure) and 2) its meaning (i.e. deep or underlying structure). To bridge both surface and deep levels of language, rules of syntax and grammar are used. The reader uses prior syntactic and semantic knowledge to provide

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1 Kenneth S. Goodman, "The Psycholinguistic Nature of the Reading Process", in Kenneth S. Goodman (ed.), The Psycholinguistic Nature of the Reading Process, Detroit, Wayne State University Press, 1968, p. 25.

specific meaning to a particular subject.[2]

Chomsky and Halle[3] have provided a model for an insightful view of mature reading. They link the reader's knowledge of language with his ability to read. When presented with a string of printed symbols in conventional reading, the reader produces a string of abstract symbols using his internalized grammar of language. On the basis of his previous knowledge of syntax, semantics and situational information, the reader is able to understand what is read and assigns a surface structure to the abstract representation.

The ability to use structure in reading comprehension progresses from a concrete to an abstract stage as the child's language and thought become more sophisticated with maturation. The development of the child's semantic system also indicates a progression from perceptual to conceptual dependence.[4]

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2 Frank Smith, Psycholinguistics and Reading, op. cit, p.3.

3 Noam Chomsky and Morris Halle, The Sound Pattern of English, New York, Harper and Row, Publishers, 1968, p. 6,7.

4 Lev Semenovich Vygotsky, Thought and Language, Cambridge, Massachusetts, The M.I.T. Press, 1962, p. 124, 125.

Bever and Bower[5] described how children's knowledge of grammar and strategy for auditory sentence perception are used in perception of print (or what is read). Reading was viewed as the ability to extract from the visual signal, the underlying structure of sentences.

Goodman[6] provided evidence to support Smith's idea that the student utilizes expectations about the text based on his prior knowledge of language and his prior experience. For example, a typical ghetto child may read: "Lots of goats was ...". It may appear that the child has mistaken "were" as "was"; however, it may be that he understood the statement but reconstructed it in his own dialect thus drawing on his own experimental background.

To Goodman, reading is a "psycholinguistic guessing game". That is, the reader utilizes guessing strategies by sampling possible cues in the printed message and then matching it to the given input. Goodman asserts, therefore, that the ultimate goal in reading is direct passage from print to meaning.[7]

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5 T.B. Bever, and T.G. Bower, "How to Read Without Listening", in Project Literary Reports, No. 6, 1966, p. 13-25.

6 Kenneth S. Goodman, "Reading: A Psycholinguistic Guessing Game", in Journal of the Reading Specialist, No. 4, May 1967, p. 126-35.

7 Ibid., p. 127.

In relation to studies conducted by Goodman and Smith, Morton[8] provided evidence that a reader having language experience characteristics of the language as a whole, utilizes some of the available context in order to 'predict' the immediate stimulus. This makes the immediate stimulus more probable and the reader requires fewer visual cues to perceive it.

Kolers[9] confirmed Smith's position when he wrote that reading is only one aspect, only one part of the reading process. Reading is not a simple matter of translating familiar visual graphemes into phonemes.[10] He suggested that the teaching of reading moves away somewhat from the purely visual and purely geometric and emphasizes information-extracting characteristics.[11]

In the same way, Huey[12] emphasized that reading is principally an information-gathering activity. Thus it can

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8 John Morton, "The Effects of Context on the Visual Duration Threshold for Words", in British Journal of Psychology, Vol. 55, No. 2, 1964, p. 165.

9 Paul Kolers, "Reading is Only Incidentally Visual", in Kenneth S. Goodman and James Fleming (eds.), Psycholinguistics and the Teaching of Reading, Delaware, International Reading Association, 1969, p. 8.

10 Ibid., p. 13.

11 Ibid., p. 15.

12 E.B. Huey, op. cit., p. xxv.

be inferred that it would be more useful to attempt its teaching in those terms and move away from a "purely computational" approach. Huey sees reading as an active process. He implies that in no way can information transfer occur as a passive uptake of materials from the printed page but rather, it is what the reader "finds" in the printed page that reflects his knowledge, his assumptions, and many other cognitive events that carry him beyond and give significance to the text itself.[13]

The idea that reading is far more than the recognition of graphic symbols, is supported in this statement by Dechant:

> Reading is a process of giving the significance intended by the writer to the graphic symbols by relating them to one's own fund of experience.[14]

Kolers,[15], Horn,[16] and Strang,[17] have all pointed out that an author stimulates the reader to construct ideas from

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13 Ibid., p. xxv.

14 Emerald Dechant, Reading Improvement in the Secondary Schools , New Jersey, Prentice-Hall, Inc., 1973, p. 19.

15 P. Kolers, op. cit., p. 11.

16 Ernest Horn, Methods of Instruction in the Social Studies, New York, Charles Scribner's Sons, 1937, p. 154.

17 Ruth Strang, Learning to Read, Insights for Educators, The Peter Stanford Memorial Lectures: The Ontario Institute for studies in Education, 1970, p. 30.

his own fund of experience. A selection is more difficult to read when it deals with ideas that are foreign to the reader's experience.

If the student is experiencing difficulty in reading, often it is not the author's style or vocabulary that troubles him, but rather the complexity or profundity of the thought required. Many ideas expressed in typical textbooks are so intrinsically complicated with technical jargon that the reader is left confused. The background of experiences and interest that might make statements intelligble is not provided in the books and it cannot be assumed to be in the possession of the student. Under these circumstances intelligent reading is impossible.[18]

Dechant has emphasized the importance of experience as the basis for all educational development:

> Concepts develop from experience and their richness and scope are in direct proportion to the richness and scope of the individual's experience.[19]

An important difference between the adult's concepts and those of the child is the difference in experience and knowledge. The differential experience may also be a significant reason for differences in reading achievement among students. A student does not become a good reader of graphic

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18 E. Horn, op. cit., p. 158.

19 E. Dechant, op. cit., p. 41.

symbols without becoming a reader of experience. Reading thus requires three things: 1) the student must have acquired the necessary experience (nonvisual information), 2) he must associate meaning with the symbol (the trade-off between visual information and nonvisual information), and to do the latter 3) he must identify the symbol (visual information).[20]

The importance of experience in the acquisition of reading technique is best illustrated in the language-experience approach to the teaching of reading. This method teaches beginners to read through associating print with meaningful personal experiences. A strong advocator of this method is Russell G. Stauffer, who emphasized the importance of taking a child's linguistic, social and cultural background into account when learning to read.[21] Stauffer placed special emphasis on the effect maturation and experience have on the child's reading ability.

To reiterate, reading is seen as a constructive process, whereby, the reader makes a significant contribution. Reading involves the use of effective sampling strategies

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20 Ibid., p. 30.

21 Russell G. Stauffer, The Language-Experience Approach to the Teaching of Reading, New York, Harper and Row, 1970, p. 254.

which are based on the knowledge of language and on the nature of the reading situation. The ability to read with comprehension, requires the student to go beyond the simple identification of words in a sequence, to draw upon his "nonvisual information" and to apply that information to newly encountered reading experiences.

Experience is the foundation of meaning; it is experience which gives meaning to ink marks on a sheet of paper. If a pupil does not have this background of experience, he can do little more than resort to rote memorization of meaningless words; this develops verbalizers rather than readers.

Horn[22] stated that "verbalism is not a thing of the remote past ... it is still widespread, at every level from the kindergarten to the grade school as well as in society at large."

The reader who brings the most to the printed page, gains the most. Chall,[23] gave an information test about tuberculosis to about one hundred 6th and 8th graders. She then had them read a selection on tuberculosis and gave them a test on the selection. Those who knew most about the

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22 E. Horn, op. cit., p. 141-143.

23 Jeanne Chall, "The Influence of Previous Knowledge on Reading Ability", in Educational Research Bulletin, Ohio State University, Vol. 26, Dec. 10, 1947, p. 225-30.

disease made the best comprehension scores on the reading selection. Chall writes: "we read in order to gain experience, and yet we get more out of reading if we have more experience".

The literature would suggest that for comprehensive reading to occur, nonvisual information is an essential ingredient. Texts can be comprehended only if they are read for meaning first.[24]

Strang[25] and Shores[26] have summarized the importance of that which the reader brings to a reading encounter. According to them, the potential for developing reading competence is rooted in the innate capacity of the individual. One important characteristic for this development is the ability to organize and relate one's experience.

Any reading program depends to a great extent on the concepts of reading development held by its teachers and administrators. If reading is considered primarily a visual

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24 Frank Smith and Deborah Holmes, "The Independence of Letter, Word and Meaning Identification in Reading", in Reading Research Quarterly, Spring, 1971, Vol. 6, No. 3, p. 413.

25 R. Strang, op. cit., p. 2.

26 J. Harlan Shores, "The Nature and Scope of the Problem and the Attack on It", in William Gray (ed.), Improving Reading in all Curriculum Areas, Proceedings at the Annual Conference on Reading, held at the University of Chicago, 1952, Chicago, University of Chicago Press, Vol. xiv, 1952, p. 3.

task, attention will be given only to testing visual and auditory efficiency but if teachers believe that reading includes "reading between the lines and beyond the lines", their questions will call for more inferences, generalizations, conclusions and critical evaluation.[27]

According to Shores[28] the importance of nonvisual information or experiential background in reading is as follows: 1) Comprehension cannot be more adequate than are the experiences that the reader has had in a particular area, 2) Experience must be specific to the requirements of a particular reading task.

2. Reading and Comprehension

Since much of the knowledge contained in the school's curriculum is transmitted through the medium of written language, the failure or success of the educational system is heavily dependent upon the student's ability to comprehend the language in his instructional materials.

It has been pointed out in the first part of this chapter, that the reader's experiential background is

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27 R. Strang, op. cit., p. 9.

28 J.H. Shores, op. cit., p. 3.

essential in the reading process. Words and numbers are abstract symbols which are nonsense until the reader can bring an experience to the symbols. Thus, complete lack of experience or background information, means complete lack of comprehension. Comprehension cannot be more adequate than are the experiences that the reader has had in a particular area. There does not seem to be any alternative to the deliberate development of background experience which would enable the student to grasp new concepts more easily.

According to Wiener and Cromer,[29] comprehension implies the derivation of some form of meaning and the relating of this meaning to other experiences or ideas.

Goodman[30] has advanced the premise that the goal of reading instruction should shift away from word focus to comprehension. His belief is that programs must be defined to build comprehension strategies. Children learning to read should see words always as units of larger,

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29 Morton Wiener and Ward Cromer, "Reading and Reading Difficulty: A Conceptual Analysis", in Harvard Educational Review, Vol. 37, 1967, p. 621.

30 Kenneth Goodman, "Words and Morphemes in Reading", in K. Goodman and J. Fleming (eds.), Psycholinguistics and the Teaching of Reading, Delaware, International Reading Association, 1969, p. 32.

meaningful units. Educators must remember that learning should not take place in isolated units.

Bormuth[31] has firmly stated that comprehension is one of the most important and weakest areas of instruction. Educators often attribute poor comprehension to the intellectual inadequacies of the student. Perhaps the problem is not being seen in its proper perspective. Focus should be placed on the instructional techniques which are being implemented by the teacher.

To restate the question posed in the introduction of this paper: is it that, "Johnny does poorly in history because he can't read, or is it that, "Johnny can't read because he does poorly in history"? Simply stated, does the student approach the reading encounter with enough experiential background (or nonvisual information) so that new material can be absorbed, comprehended and conceptualized?

Comprehension, as operationally defined by Smith, is "the reduction of uncertainty".[32] When the reader has

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31 John Bormuth, "An Operational Definition of Comprehension Instruction", in K. Goodman and J. Fleming (eds.), Psycholinguistics and the Teaching of Reading, International Reading Association, 1969, p. 48.

32 F. Smith, Understanding Reading, op. cit., p. 35.

comprehended or extracted meaning from a passage, his uncertainty about the material has been reduced; that is, he has had a certain set of alternatives reduced.

Smith's following statement serves to clarify his definition of comprehension:

> If we regard reading like any other process of acquiring information, namely the reduction of uncertainty, then we have discovered the first way in which the conventionally disparate areas of letter identification, word identification, and "reading for comprehension" can be considered in the same light. In each of the three aspects of reading, information is acquired visually to reduce a number of alternative possibilities. The exact number of alternatives can be specified for letters, an approximate figure can perhaps be put to the number of words, but the number of alternatives for comprehension, if it can be estimated at all, must obviously be closely related both to the passage being read and the particular individual who is doing the reading ... We may not know how much uncertainty an individual has about the identity of the sovereign of England in the year 1900, but we do know that this uncertainty must be reduced if he reads and comprehends a message that the sovereign was a woman.[33]

Therefore, Smith's definition of comprehension, as the reduction of uncertainty, is closely related to his definition of nonvisual information. The individual who possesses a greater amount of nonvisual information will have a fewer number of alternatives from which to choose.

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33 Ibid., p. 19.

Chomsky's and Halle's[34] theory of deep and surface structure of language tends to support Smith's theory regarding the reduction of uncertainty. According to Smith, the reader absorbs information from the environment (reduces his uncertainty) on the basis of the visual information (the surface structure of language) and all the deep structure of language and knowledge of the world that is contained within his brain (i.e., nonvisual information).[35]

Accordingly, Smith described man's brain as a processor of information.[36] "Man is a creature who devours information. He spends much of his waking time selecting and acquiring information and a good part of the time he is asleep organizing it."[37]

Anisfeld[38] claimed that complete perception of all details is unnecessary for total understanding. Reading should be considered, not as a process by which the reader must extract full information from print for oral rendition,

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34 N. Chomsky and M. Halle, op. cit., p. 6-7.

35 F. Smith, Understanding Reading, op. cit., p. 69.

36 Ibid., p. 28.

37 Ibid., p. 28.

38 M. Anisfeld, "Language and Cognition in the Young Child", in K.S. Goodman (ed.), The Psycholinguistic Nature of the Reading Process, Detroit, Wayne State University Press, 1968, p. 167-83.

but rather as a process of using information to decide among alternatives. Reading is assumed by Anisfeld to be a hierarchial process which focuses on the elimination of uncertainty.

Olson[39] wrote that it was futile to talk of any "intrinsic" meaning of a word or sentence and that a meaning can be defined only in terms of the alternative possibilities that it eliminates, i.e., meaning is related to the reduction of uncertainty.

One of the most important concepts Smith mentioned in his theory is "redundancy", a concept which is referred to very infrequently in the literature on the psychology of reading and one which is ignored in many studies of language. As Smith explained it:

> Redundancy exists whenever information is duplicated by more than one source.[40]

One way to provide redundancy is to repeat everything. In this method the alternative sources of information are two successive sentences. Another method of presenting the same message twice is an audiovisual, multimedia approach, a

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39 David R. Olson, "Language and Thought: Aspects of a Cognitive Theory of Semantics," in Psychological Review, Vol. 7, No. 4, July 1970, p. 257-271.

40 F. Smith, Understanding Reading, op. cit., p. 19.

technique often used in advertisements. Redundancy, therefore, reduces uncertainty in the reader's comprehension of a message.

Smith wrote:

> It is particularly true in reading that the larger the context, the greater is the redundancy. And the more redundancy there is, the less visual information the skilled reader requires.[41]

The intake of visual information is supplemented by the additional information (i.e., redundancy) that the reader has already stored as a consequence of his previous experience and his knowledge of language. This preacquired fund of knowledge (i.e., nonvisual information) is organized and stored in long term memory and can be easily drawn upon by the reader.[42]

A fluent reader, as defined by Smith, is one who makes the maximum use of redundancy in both identification and comprehension.[43] Knowledge of redundancy constitutes a readily available source of information that reduces the amount of visual information required to read.[44]

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41 Ibid., p. 23.

42 Ibid., p. 77.

43 Ibid., p. 9.

44 Ibid., p. 201.

In summation, comprehension, is of vital importance in the reading process. Redundancy in language and reading decreases the number of alternatives available to the reader and reduces his uncertainty. This reduction of uncertainty is comprehension.

3. Reading and the Cognitivists

The following section will provide a very brief outline on three cognitivists' theories and their relationship to Smith. Smith's theory of reading finds its origin in the works of the cognitivists, namely: Ausubel, Bruner and Piaget.

The point has been made that the reader does not comprehend material in isolated units. New ideas are carefully encountered, related and sorted into existing cognitive structures. The reader imposes organization on the information it receives from the world through his receptors. This information is organized into related categories which reflect the reader's personal interests and experiences. The more familiar the reader is with a particular subject, the more complex the network of categories will be. The particular category to which the reader allocates an event, depends on what it is distinguished from; that is, what he sees depends upon the

nature of the alternatives that he wants to exclude.[45] For example, an individual living in a temperate zone may only require one category for "snow", whereas, one living in an Arctic area may require much finer discriminations. Therefore, the reader categorizes incoming information on the basis of his personal perception.

To exemplify this point more clearly, Smith wrote:

> Every aspect of reading can be seen as a process of categorization. The identification of letters involves allocating the incoming of visual information (from the marks on the page) into a set of 26 pre-established categories each associated with the name of a letter of the alphabet. The identification of words involves allocating the visual information to a much larger set of categories, each of which has the sound of the word as a name and also a number of related semantic connections or associations. Reading for comprehension or identification of meaning involves the allocation of visual information into category structures that represent meaning to the reader. In every case, the same visual information is utilized but it is allocated cognitively in a different way.[46]

Cognitivism has been described as being concerned with information processing and decision making. It will be recalled that Gates'[47] definition of reading provided

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45 F. Smith, Understanding Reading, op. cit., p. 72.

46 Ibid., p. 77.

47 A.I. Gates, op. cit., p. 9.

in Chapter I, listed thinking, evaluating, judging, imagining, reasoning and problem-solving, as important facets of the reading process; that is, reading is a cognitive and information processing activity which involves all types of thinking.

Bruner[48] stated that incoming information is organized in terms of pre-existing categories or causes the formation of new ones. It is Bruner's contention that all of man's interaction with the world must involve classifying input in relation to categories that already exist - in his words, completely novel experiences are "... doomed to be a gem serenely locked in the silence of private experience".

This is in accordance with Smith's theory that reading is simply a visual process. The knowledge possessed by the reader (nonvisual information) is a contributing factor in his ability to read with comprehension. The reader relates his new reading experience to pre-existing cognitive structures or categories and therefore lends support to the position taken by Smith.

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48 Guy R. Lefrançois, Psychological Theories and Human Learning: Kongor's Report, Monterey, California, Brooks/Cole Publishing Company, 1972, p. 206.

Piaget's work is supportive of Smith's and parallels Bruner's in many ways. Piaget has theorized that reading development is a cumulative process which progresses along a developmental continuum.

He has written:

> Each of the stages of learning integrates with the preceeding stage and prepares the way for the following one.[49]

The reader reacts to a new reading encounter on the basis of his previous learning experiences which Piaget has termed "assimilation". That is, new reading is assimilated into a pre-existing cognitive structure or schema. Whenever the reading causes a change in behaviour (or the enlargement of a schema), it is a result of "accommodation".[50]

The mature reader, in Piaget's terms, having gone through the transition from concrete to formal operations in thought, may now develop his cognitive structure by using "anticipatory schemas". Implicit in Bruner's writings is the idea of the cue strategy system or "anticipatory cues", which is closely related to Piaget's "anticipatory schemas".

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49 Jean Piaget as quoted by Frank G. Jennings, in "Jean Piaget: Notes on Learning", in Saturday Review, May 20, 1967, p. 83.

50 G. Lefrançois, op. cit., p. 233-36.

Flavell[51] discussed three aspects of Piaget's anticipatory schema as a system of operations where 1) background information is used in incidents where the individual is confronted with solving a problem, 2) the reader assimilates new experiences into existing schemata and accommodates existing schemata to new experiences, this results in 3) the creation of new schemata on which future learning may be based. Once again, this relates to Smith's theory which integrates new concepts with previously learned similar concepts.

Ausubel has advanced a position similar to Bruner's and Piaget's and one that is supportive of Smith. Ausubel's orientation has been explicitly cognitive and his main concern is "meaningful verbal learning". He believes that learning has been hierarchial in nature; that is, new learning is facilitated by past experiences.

In meaningful learning, cognitive structure is always a relevant and crucial variable. Ausubel commented:

> Since potentially meaningful material is always learned in relation to an existing background of relevant concepts, principles, and information, which provide a framework for its reception and

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51 John H. Flavell, The Developmental Psychology of Jean Piaget, New York, Van Nostrand Reinhold Company, 1963, p. 169.

> make possible the emergence of new meanings, it is evident that the stability, clarity and organizational properties of this background crucially affect both the accuracy and clarity of these emerging new meanings and their immediate and long-term retrievability ... Hence, it is largely by strengthening relevant aspects of cognitive structure that new learning and retention can be facilitated.[52]

The cognitive psychologists have proposed that cognitive structure is centrally involved whenever meanings emerge or are acquired, as in learning to read.[53]

Ausubel stated that meaning emerges when a) the learner manifests a meaningful learning set, i.e., a set to relate the learning task to what is already known, and b) that the learning task itself is potentially meaningful to the learner's structure of knowledge.[54]

Whether material is potentially meaningful or relatable to a given learner's structure of knowledge is more complex than meaningful learning set. It depends on two factors involved in establishing this kind of relationship - that is, on 1) the nature of the material to be

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52 D.P. Ausubel, "Some Psychological Aspects of the Structure of Knowledge", in Stanley Elam (ed.), Education and the Structure of Knowledge, Chicago, Rand McNally, 1964, p. 234.

53 D.P. Ausubel, "Cognitive Structure: Learning to Read", in Education, Vol. 87, No. 9, May 1967, p. 544.

54 Ibid., p. 544.

learned, and 2) on the availability of relevant content in the particular learner's structure.[55]

According to Ausubel:

> Learning to read is essentially a matter of learning to perceive the potential meaning in written messages and then relating the perceived potential meaning to cognitive structure so as to comprehend it.[56]

Ausubel suggested that "advanced organizers" facilitate learning by mobilizing relevant concepts under which the reader may subsume subsequent information. He also suggested that the learning of unfamiliar but meaningful material may be facilitated by the use of an advanced organizer prior to reading the new material.[57] The principal function of an organizer is to bridge the gap between what the learner already knows and what he needs to know before he can successfully learn the task at hand.[58]

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55 Ibid., p. 544.

56 Ibid., p. 545.

57 Ibid., p. 545.

58 D.P. Ausubel, Educational Psychology, A Cognitive View, New York, Holt, Rinehart and Winston, 1968, p. 148.

Recognizing the importance of Ausubel's theory, Smith and Hesse[62] investigated the effect a "cognitive organizer" had on improving reading. To help eleventh graders establish a framework for reading a story, a tape-recorded "cognitive organizer" was prepared. It provided an organizational framework for the selection to be read, without disclosing significant details, inferences, or the main idea. The group was divided into good and poor readers. Both groups read the same selection, responded to an interest inventory, and completed a seven item comprehension test. Prior to reading the selection, the experimental group listened to the three minute cognitive organizer.

Four variables were analyzed: detail recall, inference, main idea and attitude. It was found that good readers scored significantly higher than poor readers on all variables. The study raised an important question of whether or not good readers would have scored higher in any event. However, with the exception of attitude there were no significant differences between the experimental and control groups. The authors concluded that the use of a cognitive organizer seemed to have a positive effect

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62 Richard J. Smith and Karl D. Hesse, "The Effects of Prereading Assistance on the Comprehension and Attitudes of Good and Poor Readers", in Research in the Teaching of English, Vol. 3, 1969, p. 166-177.

on the attitude of poor readers but was of dubious value, except for developing positive attitudes, for good readers. Further, poor readers seemed to be helped by the cognitive organizer in determining main ideas, which was measured by one item on the comprehension test.

Since attitude toward reading is one of the major hurdles to overcome with poor readers, it seems the use of cognitive organizers would be worthwhile with such students.

Using the same materials reported by Smith and Hesse, Andrews[63] investigated the comparative effects of a cognitive organizer and a directed reading question on eleventh graders' comprehension.

Results showed that students who received the cognitive organizer had a mean comprehension score significantly higher than the score obtained by the students who were given the directed reading question.

In a later study, Andrews[64] investigated the relative effects of three modes of prereading assistance -

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63 Larry Andrews, "Directed Reading Question and Cognitive Organizer: Comparative Effect on Reading Comprehension", in Research in the Teaching of English, Vol. 5, 1971, p. 79-83.

64 _____, "Reading Comprehension and Three Modes of Prereading Assistance", in Journal of Reading Behaviour, Vol. 5, No. 4, Fall, 1972-73, p. 237-39.

a directed reading question, a cognitive organizer and a third mode, combining the directed reading question and the cognitive organizer - upon seventh graders' comprehension of a prose selection.

Prior to a silent reading of the task selection, Group A listened to an audio recording of a directed reading question, Group B listened to an audio recording of the cognitive organizer, Group C listened to both the directed reading question and the cognitive organizer. After reading the selection students completed a seven item comprehension test.

Test scores revealed significantly greater comprehension for the student who listened to the cognitive organizer. The directed reading question produced the lowest scores. Therefore, it appears that advance organizers can and do facilitate learning. Firstly, they draw upon relevant anchoring concepts which are already part of the learner's cognitive structure. Secondly, they provide "anchorage" for future learning. Thirdly, students are not forced to memorize material in a rote fashion; instead they are made familiar with new disciplines by having a sufficient number of anchoring ideas on which to base new information; that is, they are increasing their nonvisual information.

4. Summary

To summarize, this review of related literature studies has dealt with three aspects of the reading process: reading and nonvisual information, reading and comprehension, reading and the cognitivists.

If one considers the role of nonvisual information in the reading process, evidence abounds to support Smith's major premise, that reading is more than a visual process. That is, success in reading is more a function of what the reader brings to the page, than what he takes from the page. It is nonvisual information, or the prior knowledge of reading of language and of the world in general, that the reader possesses which is of vital importance in the reading process. According to Smith comprehension will be impeded if the reader lacks a sufficient amount of nonvisual information. This is an integral part of Smith's theory and it provides the major premise on which this thesis is based.

Part two of this chapter outlined the relationship between reading and comprehension. Studies have indicated that meaning identification preceeds word or sentence identification. That is to say, that if a student possesses an understanding of a particular subject area prior to the reading encounter, reading comprehension will be facilitated. Perhaps this may provide some insights into the question of why Johnny can't read.

Part three of the chapter has attempted to substantiate Smith's theoretical position by discussing its relationship with the cognitivists theorists, namely: Bruner's anticipatory cues, Piaget's theory of assimilation and accommodation and anticipatory schemas and Ausubel's theory of meaningful verbal learning and advanced organizers.

5. The Problem

Although many theorists have expounded on the educational implications of prior knowledge in the learning process, few studies have been conducted to determine its effect on the reading process. The purpose of this paper is to examine the theoretical contention that a greater amount of nonvisual information in the reader will notably improve comprehension ability.

6. The Research Hypothesis

The theoretical expectation, modified and refined by the review of related studies may be restated as the following research hypothesis:

> On a test of reading comprehension, the reader who possesses a greater amount of nonvisual information scores significantly higher than

the reader who possesses a lesser amount of nonvisual information.

CHAPTER III

EXPERIMENTAL DESIGN AND DATA ANALYSIS

The experimental aspect of this work evolved from the research hypothesis outlined in the previous section. The chapter begins with a description of the research instrument and then is followed by an outline of the research procedure used in the experiment. Included in this outline are: a) population and sample and b) the treatment. The chapter concludes with the analysis of data and a brief summary.

1. The Cloze Procedure

To test the research hypothesis presented in the previous chapter, the following research technique was selected: The Cloze Procedure[1].

The decision to use the cloze procedure was made after a personal interview with Smith, who suggested that this method of measuring comprehension, would best serve to investigate the validity of the theoretical expectation of this study. Several principles inherent in the cloze

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1 Wilson L. Taylor, "Cloze Procedure: A New Tool for Measuring Readability", in Journalism Quarterly, Vol. 30, Fall, 1953, p. 415-33.

procedure, correspond closely to his psycholinguistic theory of reading.

The cloze procedure is defined as:

> A method of intercepting a message from a "transmitter" (writer or speaker), mutilating its language patterns by deleting parts, and so administering it to "receivers" (readers and listeners) that their attempts to make the patterns whole again potentially yield a measure of their ability to deal with the general meaning and form intended.[2]

Tests made by the cloze procedure have attracted much research interest because they seem to offer a valid, convenient and completely objective method of constructing tests that can be used for measuring either the reading comprehension abilities of students or the comprehension difficulties of passages.

The cloze technique is based on the "Gestalt" theory of closure. That is, there is a strong tendency for the individual to perceive wholes; when small parts are missing, one tends to fill them in. The ability to derive the correct meaning of a sentence in which not all words are recognized, and to pronounce a word correctly when some letters are blotted out, are examples of closure.

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2 Ibid., p. 416.

Critics of the cloze procedure have suggested that often the reader guesses the answer without really comprehending the message. However, Stauffer[3] has firmly stated that it is not a "guessing" technique. It requires the use of the intellectual process of logical analysis - imagery, reasoning, evaluating, judging and problem-solving. This coincides with Gates' definition of reading, provided in Chapter I which defines reading as a process which embraces all types of thinking, evaluating, judging, reasoning and problem solving.[4]

When a child is asked, therefore, to use language context clues to recognize a word, he is not being asked to guess. On the contrary, he is being asked to use his intellectual powers to their fullest, to comprehend so thoroughly that he can make logical cognitive deductions. Convergent type of thinking is being required as the pupil focuses all the information at hand on the missing word or concept. The process of reading comprehension is arrested when an unrecognized word retards comprehension.[5]

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3 Russell G. Stauffer, Teaching Reading as a Thinking Process, New York, Harper and Row Publishers, 1969, p. 305.

4 A.I. Gates, op. cit., p. 9.

5 R.G. Stauffer, op. cit., p. 305.

Every reader, that is, the highly skilled as well as the semiskilled uses context clues to meaning, because as McCullough[6] stated "the verbal woods are full of context aids to reading."

Taylor[7] felt that an individual's performance on a cloze test is a measure of his ability to understand the meaning of the material being read ... meaning based upon general language facility, vocabulary relevant to the material, native learning ability, prior experience and motivation.

According to Rankin[8], it may be inferred that the ability to make correct word predictions of the precise words deleted in a cloze test is indicative of the respondent's grasp of "meaning" contained in the passage.

Schneyer[9] suggests that in order for the reader to be able to select specific words for the cloze passage, he

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6 Constance M. McCullough, "Context Aids in Reading", in The Reading Teacher, Vol. 11, 1957-58, p. 225.

7 W.L. Taylor, op. cit., p. 415-33

8 Earl F. Rankin, Jr., "The Cloze Procedure - Its Validity and Utility", in Oscar S. Causey and William Eller (eds.), The Eighth Yearbook of National Reading Conference, Vol. 8, Fortworth, Texas, The Texas Christian University Press, April, 1959, p. 131-144.

9 Wesley J. Schneyer, "Use of the Cloze Procedure for Improving Reading Comprehension", in The Reading Teacher, Vol. 19, December 1965, p. 174-79.

must possess a knowledge of word meanings, must understand the main idea of the passage, must attend to details, and must make inferences and draw conclusions. All of these are important skills involved in reading comprehension.

Support for using the cloze procedure can be found in Smith's work. He has written:

> It is particularly true in reading that the larger the context, the greater the redundancy. And the more redundancy there is, the less visual information the skilled reader requires. In passages of continuous text, provided the content is not too difficult, every other letter can be eliminated from most words, or about one word in five omitted altogether, without making the passage too difficult for a reader to comprehend - provided that he has learned the rules related to letter and word occurrence and co-occurrence.[10]

Redundancy enables the reader to supplement what he sees with information drawn from his past experience.[11] Some degree of redundancy must exist, if the receiver is to understand the message being transmitted. A complete lack of redundancy would tend to create total disorganization.[12]

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10 F. Smith, Understanding Reading, op. cit., p. 23.

11 Ulric Neisser, Cognitive Psychology, New York, Appleton Century, Crofts, 1967, p. 135.

12 Thomas C. Potter, "A Taxonomy of Cloze Research, Part I: Readability and Reading Comprehension", Washington, D.C. Bureau of Research, Office of Education, June 1, 1968, p. 35. ERIC-EDO 35514.

a) Construction of the Test

The construction of a cloze test, as outlined by Taylor[13], includes five steps:

a) delete a number of words selected by some random method without any regard for the function or meaning of the specific words.

b) reproduce each mutilated passage with a blank space of some standard length in place of every missing word.

c) give the mutilated passage to representative samples of the subjects in question.

d) ask subjects to fill in one word in each blank, determining from the context of the remaining words what that missing word should be.

e) total the correct number of responses for each passage and consider these totals comprehension scores.

Obviously, the cloze procedure does not require an expert for either test construction or administration. The cloze passage deals with contextually interrelated series of blanks, not isolated ones. Rather than dealing directly with meaning, the cloze repeatedly samples the extent of likeness between the language patterns used by the communicator and that used by the receiver.

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13 W.L. Taylor, op. cit., p. 415-33.

In scoring cloze tests, the exact word deleted is the criterion for correctness most often used. Taylor[14] found that scores obtained by counting both grammatically correct synonyms and exact words deleted, were not significantly superior to scores obtained by using only the exact word criterion. It was concluded that the most economical and objective method of scoring cloze tests, the exact word method, showed the most valid results. Therefore, the exact word method was selected for use in this study.

b) Validity of Cloze Tests

In considering the validity of the cloze procedure, Schneyer[15] found that cloze tests have sufficient validity in measuring reading comprehension to be useful evaluating devices.

Traditionally, reading comprehension has been measured when a subject has read a passage. Then, when the passage has been read the subject's knowledge of the content of the passage is measured by his performance on multiple choice comprehension items written for this purpose. Studies have reported significant correlation

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14 Ibid., p. 415-33.

15 W.J. Schneyer, op. cit., p. 174-79.

between cloze test scores and scores on specifically written multiple-choice comprehension tests. For example, Jenkinson,[16] Ruddell[17] and Bormuth[18] all found correlations which generally ranged from .70 to about .85. Where lower correlations were observed by investigators, such as Fletcher[19] and Rankin,[20] their lower than anticipated coefficients could be explained by the low reliabilities of the tests administered and the use of a sample of college students exhibiting curtailed ranges of reading abilities.

Despite the studies supporting the validity of the procedure, criticism of it still prevails. Weaver and

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16 Marion E. Jenkinson, Selected Processes and Difficulties in Reading Comprehension, Unpublished Doctoral Dissertation, University of Chicago, 1957, 107 p.

17 R.B. Ruddell, An Investigation of the Effect of the Similarity of Oral and Written Patterns of Language Structure on Reading Comprehension, Unpublished Doctoral Dissertation, Indiana University, 1963, 116 p.

18 John R. Bormuth, "Comparisons Among Cloze Test Score Methods", in J.A. Figarel (ed.), Reading and Inquiry Proceedings of the International Reading Association, Vol. 10, 1965, p. 283-86.

19 J.E. Fletcher, A Study of the Relationship Between Ability to Use Context as an Aid in Reading and Other Verbal Abilities, Unpublished Doctoral Dissertation, University of Washington, 1959, 98 p.

20 Earl F. Rankin, Jr., "The Cloze Procedure- A Survey of Research", in Yearbook of the Southwest Reading Conference, Vol. 14, 1964, p. 133-48.

Kingston[21] performed a factor-analytic study that suggested that scores are affected by a special aptitude or ability for utilizing redundancy in a passage and supplying missing elements, independent of verbal ability. However, Bormuth[22] has been of the opinion that this "special aptitude" is a function of the knowledge which the reader brings to the reading encounter.

In another critical study, Coleman and Miller[23] tried to use the technique in measuring knowledge gained from prior inspection of the mutilated passage but found that the scores were hardly higher on the average, than those subjects who had not been presented with the unmutilated passage. It seems from this study that cloze scores are dependent on the "local redundancy" of a passage; that is, the extent to which linguistic cues in the immediate environment, or same sentence, of a missing word tend to

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21 W.W. Weaver and A.J. Kingston, "A Factor Analysis of the Cloze Procedure and Other Measures of Reading and Language Ability", in Journal of Communication, Vol. 13, p. 252-261.

22 John R. Bormuth, "An Operational Definition of Comprehension", in K.S. Goodman and J. Fleming (eds.), Psycholinguistics and the Teaching of Reading, Delaware, International Association, 1969, iii-110 p.

23 E.B. Coleman and G.R. Miller, "A Measure of Information Gained During Prose Learning", in Reading Research Quarterly, Vol. 3, 1968, p. 369-386.

supply it. However, it has been pointed out that redundancy is a key factor in aiding reading comprehension as well as being an integral part of the reading process.

Carroll and Freedle[24] surmised that cloze scores are probably more dependent on detection of grammatical than of semantic cues. They stated that the ability to fill in a cloze passage is based on inference. However, inference, in the sense used by Smith, has a much broader connotation implying that a reader must draw inferences on what is read based on past experience, the nonvisual information.

c) Reliability of Cloze Tests

Several studies have investigated the reliability of cloze tests. Fletcher[25] and Bormuth[26] have made the point that cloze tests frequently contain a number of very difficult and very easy items which are less efficient discriminators than items in the intermediate range. This fact, according

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24 John B. Carroll and Roy O. Freedle (eds.), Language Comprehension and the Acquisition of Knowledge, Washington, Washington, D.C., V.H. Winston and Sons, 1972, p. 19.

25 J.E. Fletcher, op. cit.

26 J.R. Bormuth, "Factor Validity of Cloze Tests as Measures of Reading Comprehension Ability", in Reading Research Quarterly, Vol. 4, No. 3, Spring 1969, p. 358-365.

to Bormuth[27], may contribute to high correlations between cloze tests and other measures. It may also affect test-retest and split-half reliability statistics. However, these same types of different and easy items in cloze tests may be an asset since they contribute to a test's validity with a variety of subjects over a wide range of difficulty levels. Skewed distributions are infrequently reported when cloze tests are carefully administered.

A number of studies relate reliability findings for the cloze procedure in pre- and post test scores. Taylor[28] stated that such correlations for three cloze forms employed in his investigation ranged from .80 to .88. Coleman and Miller[29] found a correlation of .93 between pre and post-test scores.

In summation, the usual method of examining reading comprehension is by measuring the end product by asking questions after the reader has completed the reading task.

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27 _____, Cloze Tests as Measures of Readability and Comprehension Ability, Unpublished Doctoral Dissertation, University of Indiana, 1962, 106 p.

28 W.L. Taylor, op. cit., p. 415-33.

29 E.B. Coleman and G.R. Miller, op. cit., p. 384.

A cloze test may be used instead to measure comprehension after the reader has completed the passage. Taylor[30] reported a correlation of .80 between cloze test results and an immediate recall test. Rankin[31] also found a correlation of .78 in a similar comparison. Apparently, cloze tests are valid and reliable measures of comprehension defined as post reading comprehension.

The cloze procedure appears to possess a very large number of potential research uses, both practical and theoretical. It would seem that cloze scores might quantify more than just comprehension, in its most restricted sense of the word; that is, to simply internalize visual information. The technique appears to measure nonvisual information, or existing knowledge, and the trade-off between visual and nonvisual information and all that is implicit in that exchange. The instrument, then, would appear to be valid for purposes intended in this study.

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30 Wilson L. Taylor, "The Cloze Procedure: How it Predicts Comprehension and Intelligence of Military Personnel", in Technical Memorandum No. 13, to the United States Air Force, Human Resources Research Institute, University of Illinois, Division of Communications, 1953, p. 1-22.

31 Earl F. Rankin, Jr., An Evaluation of the Cloze Procedure as a Technique for Measuring Reading Comprehension, Unpublished Doctoral Dissertation, University of Michigan, 1957, 105 p.

Although studies have been carried out to assess the validity and usefulness of the technique under varying conditions, many problems need to be investigated such as its applicability to different types of materials and at various age levels. Much remains to be learned about the value of this relatively new technique. Continued investigation of the cloze procedure as a predictor of comprehension seems to be warranted.

2. Research Procedure

In order for the researcher to undertake the experiment, certain selection procedures had to be adopted. Following the selection of the subjects the experimental "treatment" was undertaken. The following is a description of the population and sample and the treatment.

a) Population and Sample

The population of the study consisted of high school students whose ages ranged from fourteen to sixteen. Six classes of students were selected from both advanced and general academic levels, in a high school under the jurisdiction of the Carleton Board of Education. Three of the classes were randomly selected to form the experimental group; the remaining three formed the control group.

The frequency of students in the three age levels are shown in Table I.

Table I

Frequencies of Subjects in Group-Age Combinations

		AGE		
		14 yr.	15 yr.	16 yr.
GROUP	Experimental	32	30	7
	Control	30	25	9

b) Treatment

In order to minimize the amount of class time taken from the school day, it was agreed that only the first thirty-eight minutes (or first class period of the day) be set aside for the experiment.

During the first day of testing, the treatment was administered to the experimental group. After a brief explanation, a fifteen minute segment of a film was shown. The film was taken from a twelve part series entitled "Civilization", prepared by the British historian, Sir Kenneth Clark. After viewing the film, students were required to answer a fifty-blank cloze passage which corresponded to a section of the film which they had just seen. The cloze passage was an exerpt taken from the script of the film which had been made into book form. The passage is presented in Appendix 1.

On the second and final day, a similar procedure was followed with the "control group". In the case of this group a different film was shown. Care was taken to ensure that the testing situation was similar for both groups so that neither the testing situation nor the tester should be considered as contaminating variables.

The film was from the same series "Civilization"; however, it did not correspond to the cloze passage which the students were required to answer.

3. Analysis of the Data

The raw scores collected from the cloze test are presented in Appendix 2. A t-test was carried out on the data. A summary of the statistics is presented in Table II. The obtained value of t was 7.91. This value is significant at the .05 level. The results thus concluded that there was a significant difference between the experimental group mean and the control group mean. A glance at the data indicated that the experimental group mean was greater than that of the control group.

4. Summary

The chapter began with a description of the research technique and continued with an outline of the research procedure used in the experiment. The outline included a description of the population and sample and the treatment. The chapter concluded with an analysis of the data. The discussion of the results will be presented in the next chapter.

Table II

Summary of Statistics

Experimental Group	
Mean	31.2
Standard Deviation	5.9
Control Group	
Mean	21.4
Standard Deviation	7.6
Value of t	7.91
Number of Degrees of Freedom	121

CHAPTER IV

DISCUSSION OF THE RESULTS

This chapter is concerned with a discussion of the results presented in the previous chapter. Included in the chapter will be a brief discussion of the results as they relate to other studies, the film shown and the sample selected. After each section, possible suggestions for further research will be included. The chapter concludes with a brief summary.

1. The Results as They Relate to Other Studies

The results of the experiment supported the theoretical position stated in Chapter II of this study; that is, evidence would support the idea of a "trade-off" between visual and nonvisual information in the reading process. The amount of nonvisual information possessed by the reader enables him to relate new reading experiences to previous knowledge and thus reduces the amount of visual information required to read.

The results of this study are similar to the theories and findings of other researchers. For example, studies by

Ausubel[1] have indicated that when students are provided with related information prior to a reading task, their comprehension and retention of material is improved.

Chall[2] also provided evidence to support the idea that prior knowledge improves comprehension.

Data collected by Andrews,[3,4] Smith and Hesse[5] clearly indicated that prior information presented in the form of a "cognitive organizer", significantly improved comprehension.

The importance of experience as the basis for all educational development has been expressed in the works of Dechant,[6] Strang[7] and Stauffer.[8] Their studies have shown

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1 D.P. Ausubel, "The Use of Advance Organizers in the Learning and Retention of Meaningful Verbal Material", op. cit., p. 266-274.

2 J. Chall, op. cit., p. 225-30.

3 L. Andrews, "Directed Reading Question and Cognitive Organizer: Comparative Effect on Reading Comprehension", op. cit., p. 79-83.

4 _____, "Reading Comprehension and Three Modes of Prereading Assistance", op. cit., p. 237-39.

5 R.J. Smith and K.D. Hesse, op. cit., p. 166-177.

6 E. Dechant, Reading Improvement in the Secondary Schools, op. cit., p. 19.

7 R. Strang, op. cit., p. 30.

8 R.G. Stauffer, The Language-Experience Approach to the Teaching of Reading, op. cit., p. 254.

that concepts must develop from experience. The reader who is supplied with more nonvisual information is more capable of associating meaning with the printed symbols on a page.

Studies by Goodman[9] and Morton[10] have illustrated that the reader who utilizes his knowledge of language, his past experience and the available contextual cues, requires fewer visual cues and is more capable of predicting the immediate stimulus in the reading passage.

By utilizing the cloze procedure as a measure of comprehension, the present study has shown that by increasing the amount of nonvisual information available to students, students were able to draw on their past experience, use their language-experience as well as cues in the available context, to complete the cloze passage. The findings showed significant difference between students who were provided with background knowledge as opposed to those who were not supplied with any background information.

A brief review of the above studies seems to suggest that when the reader is presented with background knowledge prior to a reading task, his comprehension is improved. The results of this present study support the above findings.

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9 K.S. Goodman, "Reading: A Psycholinguistic Guessing Game", op. cit., p. 126-35.

10 J. Morton, op. cit., p. 165.

Since results of any experiment are subject to the probability of making an error, the following suggestions are provided should the study be replicated, First, comprehension might be tested by using more than one passage. Second, it is also suggested that further work related specifically to nonvisual information and comprehension improvement might well consider a broader spectrum of student ability groups. And third, it might be advisable to explore alternative methods of supplying students with nonvisual sources of information.

2. The Film Used

As was indicated in Chapter III, the film "Civilization" by Sir Kenneth Clark, was used for the purpose of providing nonvisual information. Although the film was successful in causing the desired effect, it was generally observed that the students found the British accent of the narrator difficult to follow at times. As it was pointed out, this was not sufficient to destroy the validity of the study, but if replicated, consideration should be given to the selection of a North-American produced film in which the dialectical differences would not be so noticeable.

3. The Sample

In a discussion with the principal after the two-day testing period was completed, it was observed by the principal that apparently the larger proportion of students in the experimental group were enrolled in a general program. Moreover, it was observed from the principal's point of view, that a larger proportion of students in the control group were enrolled in the advanced program.

It would be recommended in a replication of this study, that stratified sampling be undertaken. From the results obtained here, it might be expected that even greater differences may be found to exist between the means of the two groups.

In this particular study, students enrolled in the general program surpassed students enrolled in the advanced program. This observation on the part of the principal should be taken into careful consideration since it further serves to emphasize the importance of the obtained differences.

4. Summary

Included in this chapter was a brief discussion of the results as they related to other studies, the film used and the sample selected. Each section was concluded with suggestions for improvement of the study should it be replicated.

SUMMARY AND CONCLUSIONS

This study presented an investigation of a theory proposed by Frank Smith of the Ontario Institute for Studies in Education, a theory in which he has suggested that reading should not be regarded as simply a visual process. That is, the information contributed by the brain to the eye is greater than the information the brain receives from the eye. The eye perceives what the brain anticipates.

Smith has listed two types of information, vital to the reading process: 1) visual information and 2) nonvisual information. Visual information is simply information which comes from in front of the eyeball from the printed page. Nonvisual information is defined as information that derives behind the eyeball from the brain.

> It is what the reader already knows about language, about reading and about the world in general.[1]

In reading there is a trade-off between visual information and nonvisual information; that is, the more nonvisual information which is already known by the reader, the less visual information is required to identify a letter, a word or a meaning. Conversely, the less nonvisual

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1 F. Smith, Psycholinguistics and Reading, op. cit., p. 6.

information that can be drawn upon, the more difficult comprehension will be.[2]

This study attempted to examine the extent to which nonvisual information increases comprehension ability in the reading process.

It was hypothesized that:

> On a test of reading comprehension, the reader who possesses a greater amount of nonvisual information scores significantly higher than the reader who possesses a lesser amount of nonvisual information.

To test the hypothesis, one research instrument for measuring comprehension was selected: The Cloze Procedure.[3] The selection of this research instrument was made after a personal interview with Smith who suggested that the cloze procedure was the most viable method of measuring comprehension for this study.

The research sample consisted of six classes of high school students, ranging in age from fourteen to sixteen years, representing both male and female students who were randomly selected from advanced and general academic levels.

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2 Ibid., p. 7.

3 W.L. Taylor, "Cloze Procedure: A New Tool for Measuring Readability", op. cit., p. 415-33.

The testing took place over a two-day period in which the first period of the day (thirty-eight minutes) was allocated for the purposes of the experiment. During the first day, three of the six classes (N= 69) made up the experimental group of the study. Prior to the administration of a fifty-blank cloze test, the experimental group were shown a film which corresponded to the passage. On the following day, the other three of the six classes, made up the control group (N = 54). The same procedure was followed; that is, the group was shown a film and then was required to complete a cloze passage. However, the film shown to this group did not provide any information which would aid in the comprehension of the cloze test.

To analyze the data collected during the experiment, a t-test for uncorrelated data where the sample sizes were unequal, was used. Significant differences were found when the level of significance was established at .05.

The results tended to support Smith's theoretical position. In effect the experimental group demonstrated a greater ability to complete the cloze passage after being provided with a greater amount of nonvisual information; that is, the experimental group was shown a film which corresponded to the cloze passage.

The control group, on the other hand, showed considerably less ability to complete the cloze passage. It is assumed, therefore, that this group's difficulty in comprehension might be attributed to their being provided less nonvisual information; that is, they were shown a film which did not correspond to the cloze passage.

Therefore, to reiterate, the theoretical expectation of the study was supported; that is, a greater amount of nonvisual information does have a significant effect on comprehension ability. In other words, if a student possesses background experience or knowledge prior to a reading task, his comprehension ability will be improved.

Pedagogically, the support for this theoretical position has very important implications for the researcher and educator, alike. It would seem logical to conclude that in daily instructional practices, teachers should provide students with background information prior to a reading task. It would appear that discussion should precede the reading task, a procedure which may be contrary to current practice.

In many classrooms, the practice has been and continues to be one of presenting a reading task which is then followed by a discussion. This approach tends to penalize the reader by not maximizing the amount of nonvisual information he brings to the reading encounter.

SUMMARY AND CONCLUSIONS

It must be remembered that reading is more than a visual process. In Chapter II, it was found that Smith and several fellow theorists in the field of reading, support the position that reading is what the reader brings to the printed page. It is an act which encompasses all the knowledge and background experience which the reader has had - this knowledge includes what the reader already knows about language, about reading and about the world in general (that is, nonvisual information).

The findings of this study, perhaps may provide some insight for educators into implementing teaching approaches. In order for reading to become more meaningful, it would seem important to provide students with additional background experiences. All forms of experience may be used to make the printed page real for the pupil. The results from this experiment support a principle which has been widely accepted, but so often overlooked in the planning of textbooks, the designing of curriculum and the implementation of new pedagogical approaches to the teaching of reading and comprehension.

BIBLIOGRAPHY

Ausubel, David. P., "Cognitive Structure: Learning to Read", in Education, Vol. 87, No. 9, May 1967, p. 544-548.

In this article, the author provided his theory on the importance of meaningful learning set i.e., learning is only potentially meaningful when it is relatable to the learner's structure of knowledge.

In reading the directly perceived denotative and syntactic meanings first have to be related to relevant ideas in cognitive structure before they yield actual propositional meaning.

--------, Educational Psychology - A Cognitive View, New York, Holt, Rinehart and Winston, 1968, vii-685 p.

This text is primarily concerned with the nature, conditions, outcomes, and evaluation of classroom learning. Of specific importance to this research are the chapters dealing with learning and the availability of relevant anchoring ideas.

--------, "The Use of Advanced Organizers in the Learning and Retention of Meaningful Verbal Material", in Journal of Educational Psychology, Vol. 52, October, 1961, p. 266-274.

The article focused on the learning and retention of unfamiliar but meaningful verbal material which can be facilitated by advance organizers. Results of tests support the use of advance organizers in facilitating retention and learning.

Chall, Jeanne, "The Influence of Previous Knowledge on Reading Ability", in Educational Research Bulletin, Ohio State University, Vol. 26, Dec. 10, 1947, p. 225-230.

A study which supported the basic premise that the meaning a reader gets from a printed page depends upon the meaning he brings to the page.

Results from testing showed that students who possessed background knowledge related to a specific reading task, are facilitated in the comprehension of new material.

Dechant, Emerald, Improving the Teaching of Reading, New Jersey, Prentice Hall, Inc., 1970, iv-663 p.

This text provided an eclectic approach to the teaching of reading and discussed several new remedial approaches. Emphasis is placed on three major areas: 1) reading readiness 2) learning to read and 3) reading for learning. The author stressed the importance of experiential background in the reading process.

--------, Reading Improvement in the Secondary Schools, New Jersey, Prentice-Hall, Inc., 1973, vii-429 p.

The text provided a comprehensive look at reading problems of adolescent students by relating the principles of learning theory to the teaching of reading. The author supported the premise that reading is what the reader brings to the printed page. Using a linguistic orientation, the author provided new techniques for the teaching of reading at the high school level.

Goodman, Kenneth S., The Psycholinguistic Nature of the Reading Process, Detroit, Wayne State University Press, 1968, ii-347 p.

The text contained the papers presented at a symposium held at Wayne State in 1965. It is a compilation of various theorists' points of view on how linguistics applies to the teaching of reading. Among the contributors are: Goodman, Kolers, Anisfeld and Bormuth. The articles raise several interesting problems which may be converted into researchable hypotheses. Of prime importance is the article by Goodman in which he stated his major thesis: that reading is not reading unless there is some degree of comprehension.

--------, and James Fleming (eds.), Psycholinguistics and the Teaching of Reading, Delaware, International Reading Association, 1969, iii-110 p.

A book of readings in which several psycholinguists have expounded on some of their ideas relating to reading. Contributors include: Bormuth, Goodman, Halle and Kolers.

Huey, Edmund Burke, Psychology and Pedagogy of Reading, Cambridge, Massachusetts, The M.I.T. Press, 1968, vii-469 p.

This text, first published sixty years ago, remains a classic. The author raised several questions then, which in the last decade have become a source of debate among educators.

Although some of the author's solutions to reading problems are no longer applicable, one major recommendation

is still confirmed in the literature; that is, that when learning to read, the child should be taught to apprehend whole word sentences rather than individual words. Meaning preceeds word identification.

Jenkinson, Marion E., Selected Processes and Difficulties in Reading Comprehension, Unpublished Doctoral Dissertation, University of Chicago, 1957. 107 p.

The author made an intensive study of the reading processes of superior intelligence students. Students were asked to reveal their thinking by completing a cloze passage and then provide reasons for their choices. It was found that students who scored high on the cloze test tended to see more relationships among ideas, to have a better understanding of language structure, and to be less subjective than those who scored low.

Lefrançois, Guy R., Psychological Theories and Human Learning: Kongor's Report, Monterey, California, Brooks/Cole Publishing Company, 1972, vii-356 p.

This text provided an overview of the theories of several learning theorists. Specific references to the theories of Bruner, Piaget and Ausubel were made in this study.

Potter, Thomas C., "A Taxonomy of Cloze Research, Part I: Readability and Reading Comprehension". Washington D.C., Bureau of Research Office of Education, June 1, 1968, 51 p., ERIC No. EDO 35514.

An overall look is taken at the cloze research method as a new tool for measuring readability and comprehension. The construction of a cloze test is described as well as the reliability and validity of such tests.

Data is also provided from results obtained from using the cloze procedure with elementary and high school students. Evidence is provided which would substantiate the assumption that the cloze procedure is a viable way of measuring comprehension. The article also provided suggestions for further research of this relatively new technique.

Rankin, Earl F., Jr., "The Cloze Procedure-Its Validity and Utility", Oscar S. Causey and William Eller (eds.), in The Eighth Yearbook of National Reading Conference, Vol. 8, Fortworth, Texas, The Texas Christian University Press, April, 1959, p. 131-144.

The paper presented a summary of evidence concerning the empirical validity of the cloze procedure as a technique for measuring comprehension, readability, intelligence, pre-reading knowledge and several components of reading comprehension.

Smith, Frank, Psycholinguistics and Reading, New York, Holt, Rinehart and Winston, Inc., 1973, v-211 p.

This text provided the major premise of Smith's psycholinguistic theory of reading. It focused on three major points: 1) only a small part of the information necessary for reading comes from the printed page. 2) comprehension must precede the identification of individual words and 3) reading is not decoding to spoken language. In context with these three themes, a variety of theoretical positions and empirical data are provided.

--------, Understanding Reading, A Psycholinguistic Analysis of Reading, and Learning to Read, New York, Holt, Rinehart and Winston, 1971, vii-235 p.

The text focused on the fundamental aspects of the complex skill of reading, i.e., what is involved in reading and learning to read. The book dealt with language, communication, learning theory, the acquisition of speech and the physiology of the eye and brain.

The major theory of Smith's work is presented in this book, i.e., that prior knowledge of the world contributes more information to reading than the visual symbols on a printed page.

Stauffer, Russel G., Teaching Reading as a Thinking Process, New York, Harper and Row, 1969, 307 p.

This text is a primary source of Stauffer's position in which he has defined reading as a thinking process. He outlined the following factors as influencing reading: maturation, intellectual ability, linguistic ability and social influence. His work is firmly supported by several of the principles inherent in Piagetian theory.

Strang, Ruth, Learning to Read, Insights for Educators, The Peter Stanford Memorial Lectures: The Ontario Institute for Studies in Education, 1970, v-52 p.

Insight is provided into the complex process of learning to read. Strang's work is strongly based on the Piagetian theory of maturation. That is, it is important to have a reasonable conception of effective reading at different stages of development. Another point which is of vital importance in the reading process, is the knowledge and experience which the reader brings to the reading task.

Reading is seen as progressing along a developmental continuum. The reading process parallels the thinking process and thus the individuality of the reader must be taken into consideration.

Taylor, Wilson L., "Recent Developments in the Use of 'Cloze Procedure', in Journalism Quarterly, Vol. 33, 1956, p. 42-48.

In this article, the basic principles relating to the cloze procedure, were provided. The author explained the use of the technique and provided examples of its recent use in measuring readability and comprehension. From the studies conducted,it was reported that cloze scores might quantify more than just comprehension; they might also measure intelligence, existing knowledge and success in learning and remembering.

APPENDIX 1

CLOZE PASSAGE

Instructions: Read the following passage and then insert one word in each blank which you think would be most appropriate for the completion of the passage. (Fill in all blanks)

In 1506 Erasmus went _____ Italy. He was in _____ at the exact time _____ Julius II's famous quarrel _____ Michelangelo; he was in _____ when Raphael began work _____ the papal apartments. But _____ of this seems to _____ made any impression on _____. His chief interest was _____ the publication of his _____ by the famous Venetian _____ and pioneer of finely _____ popular editions, Aldus Manutius.

_____ passage is chiefly _____ with the extension of _____ mind through the word. _____ this was made possible _____ the invention of printing. _____ the nineteenth century people _____ to think of the _____ of printing as the _____ in history of civilization.

_____ has done more good _____ harm, and early presses _____ those that survive in _____ Plantin house in Antwerp, _____ give the impression of _____ of civilization. Perhaps one's _____ are due to a _____ development of the craft.

_____, of course, had been invented _____ before the time of _____. Gutenberg's Bible was printed _____ 1455. But the first _____ books were large, sumptuous _____ expensive. The printers still _____ of themselves as competing _____ the scribes of manuscripts. _____ of them were printed _____ vellum and had illuminations, _____ manuscripts. It took preachers _____ persuaders almost thirty years _____ recognize what a formidable _____ instrument had come into _____ hands, just as it _____ politicians twenty years to _____ the value of television. _____ first man to take _____ advantage of the printing _____ was Erasmus.

APPENDIX 2

RAW DATA OF SCORES OBTAINED BY EXPERIMENTAL AND CONTROL GROUPS ON THE FIFTY-BLANK CLOZE TEST

APPENDIX 2

RAW DATA OF SCORES OBTAINED BY EXPERIMENTAL GROUP ON THE FIFTY-BLANK CLOZE TEST*

Students	Score	Student	Score
1	12	38	33
2	16	39	33
3	22	40	33
4	22	41	34
5	22	42	34
6	22	43	34
7	23	44	34
8	23	45	34
9	24	46	35
10	24	47	35
11	25	48	35
12	25	49	35
13	25	50	35
14	25	51	36
15	26	52	36
16	26	53	36
17	26	54	36
18	27	55	36
19	27	56	36
20	27	57	37
21	28	58	37
22	28	59	37
23	29	60	38
24	30	61	38
25	30	62	38
26	30	63	38
27	30	64	38
28	31	65	39
29	31	66	40
30	32	67	40
31	32	68	40
32	32	69	41
33	32		
34	32		
35	32		
36	32		
37	33		

* All scores based on a possible score of 50

RAW DATA OF SCORES OBTAINED BY CONTROL GROUP ON THE FIFTY-BLANK CLOZE TEST*

Student	Score	Student	Score
1	3	38	26
2	6	39	26
3	6	40	27
4	9	41	27
5	10	42	28
6	10	43	28
7	11	44	28
8	12	45	28
9	14	46	29
10	14	47	29
11	16	48	31
12	16	49	32
13	17	50	32
14	17	51	32
15	17	52	33
16	17	53	34
17	17	54	36
18	18		
19	18		
20	19		
21	19		
22	20		
23	20		
24	20		
25	21		
26	21		
27	21		
28	22		
29	22		
30	22		
31	25		
32	25		
33	25		
34	25		
35	25		
36	25		
37	25		

* All scores based on a possible score of 50.

APPENDIX 3

ABSTRACT OF

An Empirical Study of the Role of Nonvisual Information in the Reading Process

APPENDIX 3

ABSTRACT OF

An Empirical Study of the Role of Nonvisual Information in the Reading Process[1]

The present study was inspired by the works of Frank Smith who postulated that reading is not simply a visual process. It involves a trade-off between visual and nonvisual information. Visual information is defined simply as information which comes from in front of the eyeball from the printed page. Nonvisual information is what the reader already knows about language, about reading and about the world in general. The present study attempted to examine the extent to which nonvisual information increases comprehension ability in the reading process.

In this connection, it was hypothesized that on a test of reading comprehension, the reader who possesses a greater amount of nonvisual information will score significantly higher than the reader who possesses a lesser amount of nonvisual information.

The research sample included six classes of high school students consisting of 123 students. Students

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1 Faith M. Silver, M.A. Thesis presented to School of Graduate Studies of the University of Ottawa, Canada, 1974.

ranged in age from fourteen to sixteen and represented both male and female students who were randomly selected from advanced and general academic levels.

Of the six classes, three made up the experimental group which was 69 in number. The other three of the six classes, made up the control group which was 54 in number.

Prior to the administration of a fifty-blank cloze test to measure comprehension, each group was shown a film. The experimental group saw a film corresponding to the cloze passage, whereas, the film shown to the control group, provided no information relating to the cloze passage.

In the inferential analysis of data, it was found that when using a t-test for uncorrelated data where the sample sizes are unequal, a significant difference was found when the level of significance was established at .05. The results confirmed the research hypothesis.