DOCUMENT RESUME

ED 313 690 CS 009 885

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TITLE Eye Movements and the Reading Process. Focused Access to Selected Topics (FAST) Bibliography No. 40.
INSTITUTION ERIC Clearinghouse on Reading and Communication Skills, Bloomington, IN.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE Feb 90
CONTRACT RI88062001
NOTE 5p.
PUB TYPE Information Analyses - ERIC Information Analysis Products (071) -- Reference Materials - Bibliographies (131)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Annotated Bibliographies; Cognitive Processes; Dyslexia; Elementary Secondary Education; *Eye Movements; Perceptual Development; Reading Comprehension; *Reading Difficulties; *Reading Processes; Reading Research
IDENTIFIERS Saccadic Eye Movements

ABSTRACT

Addressing recent trends in eye movement research, this 24-item FAST Bib contains selections which date from 1973 through the 1980s. Selections are divided into sections on overview, perceptual processes, cognitive processes, and reading disability and dyslexia. (NKA)

Focused Access to Selected Topics No. 40
*a FAST Bib by the*
Clearinghouse on Reading and Communication Skills

# Eye Movements and the Reading Process

*by Susan M. Watts*



Since the turn of the century, researchers have studied eye movements to increase their knowledge of the reading process. Early eye movement research focused on physiological characteristics of eye movements during reading, such as perceptual span, fixations, saccades, and regressions. Within the past twenty years, much of the early research has been replicated, and early findings have been confirmed with the use of highly sophisticated measurement devices; however, much eye movement research today is concerned with the cognitive processes behind reading. In such research, eye movements are considered to be a reflection of those higher mental processes.

This *FAST Bib* addresses recent trends in eye movement research. Sources cited reflect concern with the reading of continuous text as opposed to the identification of letters or words in isolation and, with the exception of the citation provided to give an overview, are divided into three sections: Perceptual Processes, Cognitive Processes, and Reading Disability and Dyslexia.

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## *Overview*

Rayner, Keith. "Eye Movements in Reading and Information Processing," *Psychological Bulletin*, v85 n3 p618-60 May 1978.

Presents a comprehensive review of studies of eye movements in reading and of other information processing skills such as picture viewing, visual search, and problem solving.

## *Perceptual Processes*

Lefton, Lester A.; and others. "Eye Movement Dynamics of Good and Poor Readers: Then and Now," *Journal of Reading Behavior*, v11 n4 p319-28 Win 1979.

Assesses eye movements of good and poor readers—third graders, fifth graders, and adults. Finds that fifth grade students who were poor readers had relatively unsystematic eye movements with more fixations of longer duration than

did good readers (both fifth-grade students and adults).

McConkie, George W. "Eye Movement Monitoring in the Study of Silent Reading." Paper presented at the Annual Meeting of the American Educational Research Association, 1979. 9p. [ED 184 050]

Summarizes the conclusions reached by eye movement studies regarding fixation duration and the region of text read during a fixation. Discusses the advantages of using an eye movement monitor connected to a computer-controlled text display in eye movement research.

McConkie, George W. "Eye Movements and Perception during Reading." Center for the Study of Reading, Urbana, IL. 1982. 86p. [ED 215 306]

Reviews the research on the visual perceptual processes occurring as people are engaged in the act of reading. The issues that are examined include the control of eye movements, perception during a fixation, and perception across successive fixations.

McConkie, George W.; Rayner, Keith. "The Span of the Effective Stimulus during Fixations in Reading." Paper presented at the Annual Meeting of the American Educational Research Association, 1973. 12p. [ED 083 579]

Presents a study in which text displayed on a cathode ray tube was varied as to the number of characters shown (size of the window). Changes in window size produced a clear effect, with a reduction in size to thirteen characters resulting in less efficient eye movement patterns.

McConkie, George W.; and others. *Perceiving Words during Reading: Lack of Facilitation from Prior Peripheral Exposure. Technical Report No. 243*. Center for the Study of Reading, Urbana, IL, 1982. 55p. [ED 217 400]

Reports the results of a study in which the eye movements of sixteen college students were monitored as they read short texts on a cathode ray tube. Finds that words were read only when directly fixated and that word identification was not facilitated by information obtained peripherally prior to the fixation.

Morrison, Robert E.; Inhoff, Albrecht-Werner. "Visual Factors and Eye Movements in Reading," *Visible Language*, v15 n2 p129-46 Spr 1981.

Discusses the effects of variations in the physical attributes of text on eye movement behavior and the effects of physical word cues processed in the reader's parafoveal vision.

Rayner, Keith. "Eye Movements and the Perceptual Span in Beginning and Skilled Readers," *Journal of Experimental Child Psychology*, v41 n2 p211-36 Apr 1986.

Reports four experiments comparing the perceptual span in second-, fourth-, and sixth-grade readers and skilled adult readers. Suggests that the size of the perceptual span is variable and is influenced by text difficulty. Concludes that the size of the perceptual span does not cause slow reading rates in beginning readers.

Wolverton, Gary S. "The Acquisition of Visual Information during Fixations and Saccades in Reading." Paper presented at the Annual Meeting of the American Educational Research Association, 1979. 17p. [ED 178 861]

Designs an experiment to identify the points at which information is acquired during reading. Finds that while little, if any, information is obtained during the saccade, visual information is being acquired throughout the fixation and the kind of information being acquired may change over the course of the fixation. Finds that eye movements respond to stimulus manipulations within the fixation as well.

## *Cognitive Processes*

Alessi, Stephen M. and others. "An Investigation of Lookbacks during Studying." *Technical Report No. 140*. Center for the Study of Reading, Urbana, IL. 1979. 40p. [ED 177 494]

Investigates the effects of looking back at relevant sections of previously read text on comprehension. Finds that after reading 24 pages of text and inserted comprehension questions, answering in the lookback condition showed better comprehension of later information that was dependent upon the prerequisite information.

Blanchard, Harry E. "The Effects of Pronoun Processing on Information Utilization during Fixations in Reading." *Technical Report No. 405*. Center for the Study of Reading, Urbana, IL. 1987. 17p. [ED 284 183]

Tests the hypothesis that the time it takes for information to be analyzed by a reader is sometimes delayed because the analysis of previously obtained information is not yet complete. Manipu-

lates comprehension difficulty of text by varying the distance between a pronoun and its referent with the intent of delaying processing effects. Finds insufficient support for the hypothesis.

Blanchard, Harry E.; Iran-Nejad, Asghar. "Comprehension Processes and Eye Movement Patterns in the Reading of Surprise Ending Stories," *Discourse Processes*, v10 n1 p127-38 Jan-Mar 1987.

Examines the eye movement patterns of skilled adult readers when encountering a surprise ending to a story. Suggests that processing at the discourse level must be considered as an influence on the eye movement control system.

Carpenter, Patricia A. *Comprehension Processes in Reading, Final Report*. Carnegie-Mellon University, Pittsburgh, PA. 1980. 70p. [ED 198 479]

Conducts two studies examining short-term memory capacity and eye fixations as part of the reading comprehension process. Finds that readers made longer pauses at points of increased processing such as encoding infrequent words and making inferences.

Just, Marcel Adam; Carpenter, Patricia A. "A Theory of Reading: From Eye Fixations to Comprehension," *Psychological Review*, v87 n4 p329-54 Jul 1980.

Presents a model of reading focusing on eye fixations as related to various levels of reading—words, clauses, and text units. Associates longer pauses with greater processing difficulty for a group of undergraduate students reading scientific articles.

McConkie, George W.; and others. *Some Temporal Characteristics of Processing during Reading. Technical Report No. 331*. Center for the Study of Reading, Urbana, IL. 1985. 65p. [ED 255 862]

Reports on an experiment that examined (1) whether letters that lie in the center of vision are used earlier in the fixation than letters further to the right, (2) how soon after a stimulus event can that event affect eye movement control, and (3) how soon in a fixation can the presence of an orthographically inappropriate letter string be shown to influence eye movement decisions. Suggests that the response time of the eyes is shorter than is usually proposed in theories of visual processing, and that eye movement decisions are made later in the fixation than has often been assumed.

McConkie, George W.; and others. "What Is the Basis for Making an Eye Movement during Reading?" *Technical Report No. 287*. Center for the Study of Reading, Urbana, IL. 1983. 23p. [ED 234 374]

Investigates three hypotheses concerning the cognitive basis for making an eye movement during reading. Finds from review of the literature that the decision to move the eyes can be influenced by visual information acquired on the fixation which immediately precedes the movement, but processing of that information is not necessarily completed by the time the decision is made.

Pollatsek, Alexander; Rayner, Keith. "Eye Movement Control in Reading: The Role of Word Boundaries," *Journal of Experimental Psychology: Human Perception and Performance*, v8 n6 p817-33 Dec 1982.

Presents three experiments which investigate the functions of spaces between words in adult reading of text. Obtains results consistent with a two-process theory in which filling spaces in the parafoveal region disrupts guidance of the reader's next eye movement, and filling spaces in the foveal region disrupts processing of the fixated word as well.

Shebilske, Wayne L.; Fisher, Dennis F. "Eye Movements Reveal Components of Flexible Reading Strategies." Paper presented at the 30th Annual Meeting of the National Reading Conference, 1980. 16p. [ED 199 648]

Reports the results of a study of reading flexibility as monitored in two college graduates. Tests subjects after they have read an expository selection two times, and correlates eye movement patterns from the first reading with those from the second. Supports the notion that both macro and micro variations in eye movement patterns resulted from flexible reading strategies under voluntary control.

Zola, David. *The Effect of Redundancy on the Perception of Words in Reading. Technical Report No. 216*. Center for the Study of Reading, Urbana, IL. 1981. 116p. [ED 208 367]

Presents a detailed examination of twenty college students' eye movement patterns as they read a group of selected passages containing manipulations of word variables that involved interword re-

dundancy and distorted spelling patterns. Supports the claim that language constraint does affect the manner in which information in text is processed during reading and suggests that certain aspects of visual detail have a high degree of cognitive prominence.

Zola, David. "The Effects of Context on the Visual Perception of Words in Reading." Paper presented at the Annual Meeting of the American Educational Research Association, 1979. 17p. [ED 184 075]

Presents observations of twenty college students reading video displays of texts to determine how readers fixate a word that is linguistically and contextually redundant and whether readers use less visual information when perceiving these highly redundant words. Finds very small differences between high and low redundancy conditions, raising doubts about the popular notion that interword context influences reading behavior.

## *Reading Disability and Dyslexia*

Pavlidis, George Th. "Eye Movements in Dyslexia: Their Diagnostic Significance," *Journal of Learning Disabilities*, v18 n1 p42-50 Jan 1985.

Reviews the research suggesting that dyslexics' erratic eye movements are not simply a consequence of poor reading skills and that results of non-reading eye movement tasks demonstrate the influence of a brain malfunction. Reports that eye movement patterns and characteristics in the non-reading "lights" test differentiated dyslexics from advanced, normal, and retarded readers.

Pavlidis, George Th. "How Can Dyslexia Be Objectively Diagnosed?" *Reading*, v13 n3 p3-15 Dec 1979.

Describes experiments showing that the eye movement patterns of dyslexic children differed from those of normal and backward readers during both a reading and a nonreading task. Discusses possible causes of dyslexia and ways of diagnosing it.

Rayner, Keith. "Eye Movements, Perceptual Span, and Reading Disability," *Annals of Dyslexia*, v33 p163-73 1983.

Reviews research on the perceptual span and control of eye movements during normal reading and on the nature of eye movements in dyslexia. States that eye movements, rather than the cause of dyslexia, reflect underlying neurological problems.

Rayner, Keith. "The Role of Eye Movements in Learning to Read and Reading Disability," *Remedial and Special Education (RASE)*, v6 n6 p53-60 Nov-Dec 1985.

Discusses characteristics of eye movements during reading for skilled, beginning, and disabled readers. Argues that eye movements are not a cause of reading problems and that training children with reading problems to make smooth, efficient eye movements will not increase their reading ability.

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**February 1990**

*This publication was prepared with funding from the Office of Educational Research and Improvement, U.S Department of Education, under contract no. RI88062001. Contractors undertaking such projects under government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or opinions, however, do not necessarily represent the official view or opinions of the Office of Educational Research and Improvement.*