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What is This?

Effect of Attention Therapy on Reading Comprehension

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Abstract

This study quantified the influence of visual attention therapy on the reading comprehension of Grade 6 children with moderate reading disabilities (RD) in the absence of specific reading remediation. Thirty students with below-average reading scores were identified using standardized reading comprehension tests. Fifteen children were placed randomly in the experimental group and 15 in the control group. The Attention Battery of the *Cognitive Assessment System* was administered to all participants. The experimental group received 12 one-hour sessions of individually monitored, computer-based attention therapy programs; the control group received no therapy during their 12-week period. Each group was retested on attention and reading comprehension measures. In order to stimulate selective and sustained visual attention, the vision therapy stressed various aspects of arousal, activation, and vigilance. At the completion of attention therapy, the mean standard attention and reading comprehension scores of the experimental group had improved significantly. The control group, however, showed no significant improvement in reading comprehension scores after 12 weeks. Although uncertainties still exist, this investigation supports the notion that visual attention is malleable and that attention therapy has a significant effect on reading comprehension in this often neglected population.

Research on attention has been voluminous; nevertheless, there is no universal agreement on how to define attention or its characteristics. Sergeant (1996) proposed that visual attention is multidimensional, with traits that involve psychophysiological and cognitive variables. For example, selective attention implies a filtering process that attenuates irrelevant stimuli while an individual focuses on relevant stimuli. Henderson (1992) defined visual–spatial attention as "the selective use of information from one region of the visual field at the expense of other regions of the visual field" (p. 260). Selective attention may also be based on the physical (color and size) or the semantic/lexical properties of the stimulus. On the other hand, in reading, activation and vigilance also are important elements, because they are associated with sustained attention, a factor that relates to the ability to maintain visual performance over time (Halperin, 1996).

Essentially, in this study, we are hypothesizing a functional information processing disorder that precludes the presence of primary cerebral pathology (Pashler, 1998).

Attention is usually involved in both early and late stages of information processing, yet tests to quantify attention frequently measure only the endpoint of a number of perceptual and cognitive processes, such as visual memory and visually guided fine motor skills (e.g., paper-and-pencil tests). Specific examples are the *Wechsler Intelligence Scale for Children–III* (WISC-III) Coding subtest (Wechsler, 1991) and the *Cancellation Test* (Rudel, Denckla, & Broman, 1978). Furthermore, both the WISC-III Coding subtest and the *Cancellation Test* are timed attention tests that require visual–motor skills. In any timed test, we are required to accept a speed–accuracy trade-off as an essential condition that could affect visual processing efficiency. We agree with Milliken and

Tipper (1998) that the end product of attentive analysis is usually addressed, rather than a mechanistic explanation of how that end product came to be. The range of therapeutic procedures that involve a variety of functions was influenced by Mirsky's (1996) multicomponent view of attention. Mirsky explained that attention is more than a process. It is a set of processes organized into a system that embraces a number of distinct functions, including focus, shift, sustain, and encode. The therapeutic goal is to facilitate attending to sources of relevant information and, simultaneously, to produce a decrement in responding to sources of irrelevant information.

The therapy used in this study concentrates on how the attentive processing of relevant stimuli may be conditioned by procedures that impede the processing of irrelevant stimuli. To fully appreciate the role of attentional dynamics in reading efficiency, it is necessary to understand the premotor

concept of attention as it relates to oculomotor readiness in reading. This model assumes that attention is engaged at the target location before a saccade can be made to that location (Clark, 1999; Henderson, 1992). After the initial processing of the foveal input, the programming of the next saccade begins when visual attention shifts from the fovea toward the right, into the parafoveal area. Thus, in effective reading, during a fixation, the reader also attends to and acquires information about the word located in the right parafoveal area (Hoffman, 1998). That is, the new locus of attention is the target of the subsequent saccade. The experimental studies of Hoffman and Subramaniam (1995) supported the hypothesis that attention drives the saccade. Ordinarily, the parafoveal area is sensitive to low spatial frequencies, because pattern resolution is limited by the spacing of the retinal ganglion cells, and pattern detection is limited by the size of the individual cones. This arrangement serves as a magnocellular (M-cell) pathway stimulant by increasing the firing rate or increasing the number of neurons participating in saccadic generation (Thibos, Cheney, & Walsh, 1987). Thus, retinal images are typically sampled at least twice in the visual system, first by the M-cell (parafoveal), then by the foveal, parvocellular (P-cell) pathways, which suggests that saccadic and perceptual tasks are being performed concurrently in typical readers. In individuals with reading disabilities (RD), the temporal synchronization between M-cell and P-cell pathways (formerly identified as transient and sustained, respectively) may not be fine-tuned (Solan, Brannan, Ficarra, & Byne, 1997). The result could be an M-cell processing deficit (Solan, Larson, Shelley-Tremblay, Ficarra, & Silverman, 2001).

Research in visual attention has indicated that transient visual attention is dominated by M-cell inputs. Steinman, Steinman, and Garzia (1998) reported specific abnormalities in the visual attention of individuals with RD,

which suggested mechanisms wherein reading would be affected by a deficient M-cell system. Although hard experimental evidence is lacking, Breitmeyer (1993) and Kowler, Anderson, Dosher, and Blaser (1995) have proposed, based on the results of masking studies, that when attention is diverted, a series of events takes place that slows visual processing. The firing rate or the number of neurons participating in saccadic generation may be reduced, increasing saccadic response latency, and therefore, the timing between the M-cell and P-cell subsystems would not be synchronized. These studies also favor Henderson's (1992) position that covert shifts of attention and overt movements of the eyes are functionally related. The effects of ameliorating impairments in saccadic accuracy, span of fixation, automatic orienting and focusing of attention, and the ability to process peripheral visual stimuli will be discussed under therapy (Facoetti, Paganoni, Turatto, Marzola, & Mascetti, 2000). Spatial attention tasks, perceptual grouping, visual search and scan, and inhibition of stimuli that are not the foci of attention suggested by Casco, Tressoldi, and Dellantonio (1998) also will be addressed. It should be noted that we have not abandoned the position advanced by Rayner, Murphy, Henderson, and Pollatsek (1989) that the underlying cause of RD is not unidimensional but may involve various antecedents.

We propose that visual attention is the catalyst that links perception with cognition. Whereas perception makes visual information available, cognition uses the visual information. McConkie, Reddix, and Zola (1992) postulated a strong distinction between perceptual processes that make information from the visible text stimulus available (i.e., that register the stimulus information as visual features) and cognitive processes that use this information in language processing (i.e., that use the visually provided information in skilled reading). The question is, Where do perception and cognition meet in a

particular individual? Or, more precisely, when does perception cease and cognitive processing begin?

Our previous research supported the notion that visual attention and oculomotor readiness therapy contribute significantly to the improvement of reading comprehension in children with mild to moderate RD (Solan et al., 2001). As each participant progressed in visual therapy, the visual input available to cognitive processing increased. The mean reading comprehension scores of 31 Grade 6 participants improved significantly from grade equivalent (GE) 4.1 to GE 6.8 after 24 individually monitored therapy sessions. Although it was reasonable to assume that visual attention was enhanced by the various therapeutic procedures, this aspect of the therapy was neither quantified nor specifically defined. In this study, we hypothesize that providing visual attention therapy that includes stimulus-driven and goal-directed procedures to a similar cohort of Grade 6 children with moderate RD will have a salutary effect on their reading comprehension.

Method

Participants

The experimental and control groups each constituted a cohort of 15 beginning-sixth-grade students (mean age = 11.3 ± 0.3 yrs.) attending academic education classes in New York City neighborhood schools. A special effort was made to identify students who represented a group with moderate RD. The experimental group members were selected at random from the 53 students who were tested with the comprehension subtest of the *Gates-MacGinitie Reading Test* (GMG), Level 5/6, Form K (3rd ed.; MacGinitie & MacGinitie, 1989). All directions recommended by the authors, especially time limits, were carefully observed by the investigators. The schools serve a mixed middle class population consisting of European American, Asian American, Hispanic, and African American

children. In this study, the selection criterion included those participants who scored between 0.5 *SD* and 1.0 *SD* below national means, equivalent to a range between the 16th and the 31st percentile ($M = 23.1$, $SD = 6.3$). We are concerned with children with mild to moderate reading impairments, a group that often has been neglected. Children who score below the 16th percentile are more likely to have significant decoding problems, which do not fit the experimental methodology of the study and therefore were not included. Although the percentile range represents 15% of a normal distribution, 28% of the sixth-grade classes qualified. Their reading comprehension grade equivalents varied from 3.5 to 4.7, with a mean GE of 4.1 ($SD = 0.46$), 2.2 years below their current grade level.

A matching cohort of 15 students whose initial mean reading scores ($M = 4.3$, $SD = 0.24$) did not differ significantly from the experimental group's constituted the control group, who received no therapy. To offer sham therapy would have presented an ethical dilemma, because neither the Institutional Review Board, nor the principal of the public school, nor the parents approved of withholding valuable classroom time without any potential benefit. Furthermore, current clinical evidence, based on a study of 3,795 participants, supports the notion that compared with no treatment, placebo intervention has no significant effect on objective or binary outcomes (Hrobjartsson & Gotzsche, 2001). All of the testing in this study was objective. Virtually all of the children had the social and educational benefits of prior supplementary help in reading with individual attention.

Because periodic school vision testing had been administered, a vision screening for acuity at far and near, hyperopia, near point of convergence, near phorias, and binocular fusion identified just 3 of the 30 children with minimal uncorrected vision disorders, and their parents were notified. Informed consent to participate in the study was obtained from the parents and from each child. The original proposal was approved by the College's Institutional Review Board.

Procedures

Attention Tests. The attention processing assessment consisted of the three subtests that constitute the attention scales in the *Cognitive Assessment System* (CAS): Expressive Attention, Number Detection, and Receptive Attention (Naglieri & Das, 1997). The standardized directions and extensive normative data analysis were followed exactly as prescribed in the CAS administration and scoring manual for ages 8 to 17 years. Each of the subtests was individually administered to all participants by one of three examiners. The three attention tests not only provide developmental measures of visual attention and of the ability to shift attention, but also quantify the potential to avoid responding to habitual features while responding to another feature. That is, the tests assess how well the child attends to relevant stimuli while being challenged with irrelevant stimuli. The Expressive Attention subtest, the only verbal response test, uses variations in color as distractors and is similar to the *Stroop Test* (Stroop, 1935). For example, the word *Green* is printed in blue, and the child is expected to respond *Blue*. The Number Detection subtest is a timed pencil-and-paper test that also measures the ability to shift attention and the resistance to distraction. The child is required to underline certain numbers that appear in regular typeface and others that appear in outlined typeface. Similarly, the Receptive Attention subtest matches letters according to physical similarity (*t* and *t*) and lexical similarity (*t* and *T*). In each of these two timed tests, the child must work from left to right and from top to bottom and may not recheck the page on completion. The timed test scoring is based on number correct minus number incorrect and time to complete the test. Therefore, the attention quotient represents the combined effects of accuracy and automaticity—that is, correctness as well as speed of response.

Attention Therapy. To the extent that the results of this study apply to the population we have defined, we have accepted overlap in the measures of attention and memory. We propose that attention is multidimensional and malleable. It involves arousal, activation, and vigilance. The question is, given the appropriate therapy, can attention be operationalized and cultivated with the expectation of improving the visual processing capacity of the child with RD (McIlvane, Dube, & Callahan, 1996)? The therapeutic regimen includes both stimulus-driven and goal-directed voluntary procedures. Moreover, to attain optimum therapeutic gains, the therapy must provide the participant with the opportunity to develop improved cognitive strategies, sometimes referred to as executive functioning (Morris, 1996).

All therapeutic procedures were administered individually, and most involved computer-assisted programs. Five attention-enhancing programs (Perceptual Accuracy, Visual Efficiency, Visual Search, Visual Scan, and Visual Span) were used in each of the 12 one-hour sessions, and the difficulty levels were increased gradually for each participant. Usually, time was available to conclude with pencil-and-paper exercises. Visual processing therapy primarily stressed arousal, activation, and vigilance. In order to achieve our goal of stimulating selective and sustained attention, the development of visual memory and cognitive strategies was also emphasized in the therapeutic regimen.

Each therapy session was initiated with the *Perceptual Accuracy/Visual Efficiency* (PAVE) program (see Note 1). Oculomotor readiness and visual processing efficiency were stressed. The oculomotor segment (Visual Efficency) requires the participant to count the frequency of appearances of a particular digit or letter while following a left-to-right sequential presentation of

three equally spaced characters per line on the screen, usually starting at 40 lines per minute. Sixty lines per minute is equivalent to one line per second, or a fixation duration of about 300 ms per character. The program automatically adjusts to challenge the individual's performance. Ultimately, 120 lines per minute were reached by most students, which reduced the visual processing time to about 150 ms per character. This therapy promotes the development of saccadic accuracy, automatic orienting and focusing of attention, and the opportunity to process visual stimuli in the right paracentral retinal area.

Perceptual Accuracy is a tachistoscope program intended to develop rapid visual processing. Initially, four digits were flashed on the computer screen for 0.1 seconds, and the individual was required to reproduce them on the screen using the computer keyboard. Although four digits at 0.1 seconds generally was not a challenge, some students found the transition from four to five digits difficult, in which case a double flash was used at first. A few students were able to master six digits at 0.1 seconds. Rapid and accurate visual processing as measured with the tachistoscope correlates significantly with reading readiness in kindergarten (Solan & Mozlin, 1986), with reading in Grades 1 through 5 (Solan, 1987a; Solan & Mozlin, 1986), and with arithmetic in Grades 4 and 5 (Solan, 1987b).

The next three perceptual procedures are included in the *Computerized Perceptual Therapy Program* developed by Dr. Sidney Groffman (see Note 2). The Visual Search program required the student to locate a designated stimulus within an array on the screen that was organized into 5 columns and 15 rows. Target stimuli consisted of four or five letters or digits, and the number of stimuli was variable. The response was identified and canceled with the mouse. Time to complete the task was affected by the ability to develop an efficient response strategy. After each trial, the computer summarized time (e.g., 31 s.) and number of correct and

incorrect responses and omissions. The presentation was randomized for each trial. Visual Search training improves visual discrimination, figure–ground perception, and perceptual speed.

In the Visual Scan program, the individual located and canceled designated target stimuli (e.g., numbers) hidden in a randomized array of distractor stimuli (e.g., letters). Because time is a factor, it is necessary to develop an aggressive strategy in order to identify the target stimuli rapidly and accurately. Enhanced peripheral awareness helps to locate the next target. Because Visual Scan is a timed exercise, visual planning and strategies are necessary to complement perceptual speed and accurate saccades. Visual Scan therapy is also effective in regulating perceptual tempo in individuals who present an imbalance between reflectivity and impulsivity.

Visual Span, the third therapeutic procedure in the Groffman series, combines a number of attributes associated with attention. The individual is required to identify and recall the exact sequence of stimuli presented one at a time at various selected speeds of presentation. Numbers or letters are available, and the length of the sequence increases or decreases automatically depending on the response accuracy. Visual Span is especially effective in enhancing visual-temporal processing and visual-sequential memory.

Results

For children with mild and moderate RD, the outcome of the attention and reading tests supported the hypotheses that visual attention is malleable and that visual attention therapy has a salutary effect on reading comprehension in this population. As there is some overlap among the three CAS attention subtests (Expressive Attention, Number Detection, and Receptive Attention), only composite standard scores are reported (see Table 1). Following the 12 one-hour weekly sessions of attention therapy, the mean total standard attention scores of the experimental group improved from 95 to 113 ($p < .01$), comparable to a change

TABLE 1
Comparisons of Pre- and Posttest Attention and Reading Comprehension Test Scores by Group

Test	Experimental group[a]		Control group[a]	
	Pretest	Posttest	Pretest	Posttest
GMG Reading Comprehension				
Percentile				
M	23.1	34.9*	24.9	25.30
SD	6.3	16.4	4.2	11.97
Grade equivalent				
M	4.10	5.2*	4.30	4.40
SD	0.46	1.4	0.24	0.89
CAS Attention[b]				
Standard score				
M	94.93	112.93**	93.9	105.7*
SD	12.88	9.75	14.7	13.7
Percentile				
M	41.1	76.8**	40.1	62.9*
SD	26.4	19.2	27.6	26.3
Learning rate (%)	58	220*		

Note. GMG = *Gates-MacGinitie Reading Test* (MacGinitie & MacGinitie, 1989); CAS = *Cognitive Assessment System* (Naglieri & Das, 1997).
[a]n = 15. [b]Composite score for three subtests.
*$p < .05$. **$p < .01$.

from the 41st to 77th percentile, $t(14) = 6.48$, $p < .01$. The growth of 1 SD in attention skills in this brief period is impressive. After completing the regimen of attention therapy, the mean reading comprehension scores of the experimental group improved significantly from GE 4.1 to GE 5.2, $t(14) = 2.468$, $p < .05$. Percentiles improved to the 35th percentile, compared to the 23rd percentile in reading comprehension before attention therapy. Posttherapy results supported the initial hypothesis; reading comprehension improved significantly after attention therapy.

The control group of Grade 6 students, whose initial mean GMG Reading Comprehension score, GE = 4.3 (25th percentile), was not significantly different from the experimental group's, GE = 4.1, $t(14) = .95$, $p > .05$, also was tested with the CAS visual attention battery. At pretest, control and experimental groups' mean attention scores were not significantly different from each other, $t(14) = .357$, $p > .05$. Unlike the experimental group, the control group did not receive either attention therapy or a placebo. The controls showed no significant improvement in reading comprehension (GE = 4.4) when tested with an alternate GMG form after the therapy period, whereas the mean comprehension score of the experimental group (GE = 5.2) improved significantly ($p < .05$). Effect size was medium (1.17). These results supported the hypothesis that attention therapy may have a salutary effect on reading comprehension.

An alternate method of interpreting the effect of therapy on reading comprehension improvement is *learning rate* (LR). The concept of LR adds educational and clinical meaningfulness to the statistical analysis. It is the ratio of GE change (in years) to the elapsed time in years (10 months equals a school year) times 100. Prior to participating in the study, this cohort of Grade 6 students improved 3 years, from GE 1.1 to GE 4.1, during their 5.2 years in school, which represents an LR of 58%. Following the completion of 12 attention therapy sessions (in 5 months), the reading skills of the experimental group progressed 1.1 years, equivalent to an LR of 220%. The control group's reading scores remained essentially constant.

Discussion

In order to interact with reading comprehension, the attention subtests must engage higher level, complex forms of attention. The tests must require that attention be focused, selective, sustained, and effortful (Luria, 1973; Naglieri & Das, 1997). The *Cognitive Assessment System* (CAS; Naglieri & Das, 1997) fulfills these requirements because the attention subtests present competing demands on attention and require sustained focus over time. Furthermore, the battery of attention subtests is brief (20 minutes), challenging, and administered individually. According to the test authors, reliability is $r_{tt} = 0.83$ ($SEM = ±1.3$). On the other hand, an analysis of the control group's retest data revealed unsystematic random variations among participants. All the random changes in this cohort of children with RD were positive and suggested a small practice effect, which may be attributed to the nature of the test, the small sample size, and the large standard deviation. The results of this study support the proposals of Mirsky (1996) and Zubin (1975) that there are three principal elements of attention—focus, shift, and sustain—which represent important aspects of the regulation of information processing. The *focusing* therapy was strongly directed toward enhancing concentration and screening out distracting peripheral stimuli. Rapid response is an implied characteristic of focus. The second element, developing an improved ability to *shift* attentional focus within the stimulus complex in an efficient, flexible manner, influences the participants' oculomotor readiness, encoding skills, and reading comprehension. *Sustaining* attention entails being able to stay on task in a vigilant manner for an appreciable interval.

This study emphasizes the need to translate general concepts gained from clinical intuition and experience into numerical values based on standardized testing, as proposed by Morris (1996). The procedures reported are for the specific disability and age level described; however, uncertainties and limitations remain when dealing with the phenomenon of attention. Earlier, we raised the question of when perception ceases and cognitive processes commence. The ability to develop age-related strategies (executive function) is an additional complexity that requires further exploration. Morris (1996) was on target when she recognized the need to derive developmentally sensitive measures for specific components of attention. That is, we must understand and treat the relevant antecedents of attention in order to evaluate the consequences of attentional therapy. Valid testing instruments are available, and their administration is routine (Naglieri & Das, 1997). The data available from this study support the notion that attentional functioning is malleable and can be modified, provided that neural processing is intact. However, the question of a practice effect requires further research.

The outcome of our previous study, involving a similar population, suggested a positive link among visual attention, oculomotor readiness, and reading comprehension (Solan et al., 2001). Statistically significant improvements in lexical development and oculomotor efficiency were measured in a population of 31 students with RD who were attending Grade 6. The results generally reinforced the role of visual attention in the maturation of oculomotor readiness. Moreover, the program linked visual attention and visual memory with cognitive strategies and mental processes in reading. However, it remained for the present study to quantify the association of attention and visual processing with reading more directly. The statistically significant parallel improvements in visual attention and reading comprehension following attention therapy

support the view that the two are linked.

Henderson (1992) and Clark (1999) have proposed similar sequential attention theories, sometimes identified as a *premotor model;* that is, the programming of a saccade to the new target location begins when the processing of the foveal input has been completed and attention has shifted to the right parafoveal location. Both proposals postulate that attention enhances perceptual processing and guides the saccades. Thus, attention and saccades are not independent (Hoffman & Subramaniam, 1995). The functional magnetic resonance imaging (fMRI) research of Corbetta et al. (1998), involving covert shifts of attention, lends further support to the hypothesis that attention and oculomotor processes are tightly integrated at the neural level. Moreover, Culham, Cavanagh, and Kanwisher (2001) observed strong activation of attention response functions in parietal area 7 and in the frontal eye fields (FEF), which provides a further link between oculomotor efficiency and reading fluency.

This study represents a preliminary investigation intended to test the hypotheses that attention skills are trainable in middle grade students with moderate RD and that the improvement in attention appears to have a significant effect on reading comprehension. Students with severe RD (below the 16th percentile), who were apt to have significant phonological deficits, were not included. The results reinforce the notion that in managing individuals identified as having mild and moderate RD, we should contemplate the interactions between attentional dynamics and oculomotor readiness as a single force. Although the experimental methodology may not be optimal in this first-step study, the limitations (e.g., sample size) do not vitiate the following outcomes:

1. Attention skills are measurable.
2. Attention therapy improves attention, as measured with the CAS Attention battery.

3. Experimental group students, who received attention therapy, scored better in reading comprehension posttests than controls, whose comprehension did not improve.

Because scoring the tests was highly objective, there was little latitude for subjective accommodations. Masking was not a major concern in this preliminary study. A special effort was made to maintain neutrality in testing. Sham therapy was not a viable alternative, because it would not have been approved by the College's Institutional Review Board or the school. Virtually all participants had the social, psychological, and academic benefits of prior individualized supplementary tutoring in reading.

Although the integrative action of the neural systems involved has been addressed, no attempt has been made to relate the neurophysiology of the brain to the aspects of attention that each of the therapeutic procedures is intended to ameliorate. The attentional neural networks in the various regions of the cortex are so extensive that to do so would be beyond the intent of this article. Nevertheless, it is evident from the results that therapeutic programs may contribute to the functional efficacy of attributes frequently associated with attention. For example, just as it is necessary to focus attention on a relevant stimulus, the ability to shift attention independently of eye movements is equally important in efficient reading. Similarly, maintaining attention at a given locus is dependent on one's ability to attenuate irrelevant stimuli. The importance of temporal factors is also notable. The commonality of these attentional characteristics is their ability to promote more efficient visual information processing.

Conclusions

Our previous (Solan et al., 2001) and present investigations support the notion that a link exists among visual attention, oculomotor readiness, and reading comprehension, although un-

certainties still exist. The principal purpose of this study was to measure the effect of visual attention therapy on reading comprehension. The present study of Grade 6 children with RD did not include reading comprehension therapy; nevertheless, statistical analysis revealed significant effects on reading comprehension in the experimental group. Furthermore, because the improvement on the attention test after therapy exceeded 1 *SD*, it is unlikely that the results should be attributed solely to a practice effect. Reading comprehension in the control group remained essentially static (< 1.0 *SEM*).

We also observed during the therapy that the integration of memory, speed of information processing, and executive function responds as a triad, which appears to influence cognitive performance and reading comprehension. However, the exact mechanism for the synchronization of the neuropsychological, oculomotor, and visual processing systems will remain elusive until we gain a more precise understanding of the neurophysiological correlates and molecular causes of attentional and reading disorders. For example, future research could stress the covert shift of attention in the processing of the parafoveal word. It would be valuable to know whether the parafoveal word is delayed or processed in parallel with the foveal word and to what extent the processing of the parafoveal word influences eye movements and reading comprehension.

ABOUT THE AUTHORS

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NOTES

1. *Related technical information and procedures are available from Taylor Associates Communications, Inc., 200-2 East 2nd Street, Huntington, NY 11746.*

2. *Available from RC Instruments, PO Box 6028, Apache Junction, AR 85278.*

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