Old Dominion University Research Foundation

DEPARTMENT OF PSYCHOLOGY
COLLEGE OF SCIENCES
OLD DOMINION UNIVERSITY
NORFOLK, VA 23529

PRELIMINARY ANALYSIS OF PHOTOREADING

By
Dr. Danielle S. McNamara, Principal Investigator
Department of Psychology

FINAL REPORT

For the period ending September 30, 1999

RECEIVED JAN 2 2000

Prepared for
NASA Ames Research Center
Attn.: Immanuel Barshi
Technical Officer
System Safety Research Branch, 262-4
Moffett Field, CA 94035-1000

Under
NASA-AMES NAG-2-1319
ODURF File No. 193021

rec'd.
JAN 18 2000
cc: 202A-3V

January 2000

CASI

Final Report

NASA-AMES-NAG2-1319

Preliminary Analysis of Photoreading

By

Dr. Danielle s. McNamara, Principal Investigator

Department of Psychology
Old Dominion University

Submitted by

Old Dominion University
Research Foundation
800 West 46th Street
Norfolk, Virginia 23508

Submitted to

NASA Ames Research Center
Moffett Field, CA 94035-1000

January 2000

Title: **Preliminary Analysis of PhotoReading**

Type of Report: **Summary of Research to NASA-Ames**

Principal Investigator: **Danielle S. McNamara**

Granting Period: May 15, 1999 to September 30, 1999

Institution: Old Dominion University, Norfolk, VA, 23508-0369

Grant Number: NAG-2-1319

Table of Contents:

Abstract 2
Introduction 2
Examination of PhotoReading 3
PhotoReading 3
Method 4
Training 4
Design of study 4
Testing Materials 5
Procedure 6
Results 7
Standardized Tests 7
Expository Texts 7
Physiology Text Book 11
Conclusions 11
References 13
Appendix A: Physiology Texts and Questions 14
Normally Read Physiology Text 14
Questions for Normally Read Physiology Text 17
PhotoRead Physiology Text 18
Questions for PhotoRead Physiology Text 21
Appendix B: Recent PhotoReading Advertisements 22

A Preliminary Analysis of PhotoReading

Danielle S. McNamara

Abstract

The purpose of this project was to provide a preliminary analysis of a reading strategy called PhotoReading. PhotoReading is a technique developed by Paul Scheele that claims to increase reading rate to 25,000 words per minute (Scheele, 1993). PhotoReading itself involves entering a "relaxed state" and looking at, but not reading, each page of a text for a brief moment (about 1 to 2 seconds). While this technique has received attention in the popular press, there had been no objective examinations of the technique's validity. To examine the effectiveness of PhotoReading, the principal investigator (i.e., trainee) participated in a PhotoReading workshop to learn the technique. Parallel versions of two standardized and three experimenter-created reading comprehension tests were administered to the trainee and an expert user of the PhotoReading technique to compare the use of normal reading strategies and the PhotoReading technique by both readers. The results for all measures yielded no benefits of using the PhotoReading technique. The extremely rapid reading rates claimed by PhotoReaders were not observed; indeed, the reading rates were generally comparable to those for normal reading. Moreover, the PhotoReading expert generally showed an increase in reading time when using the PhotoReading technique in comparison to when using normal reading strategies to process text. This increase in reading time when PhotoReading was accompanied by a decrease in text comprehension.

Introduction

PhotoReading is a technique developed by Paul Scheele that claims to increase reading rate to 25,000 words per minute (Scheele, 1993). Users of the technique claim to be able to PhotoRead an entire book within 10 minutes, and during that process develop a relatively complete or sufficient understanding of its contents (see Appendix B for copies of recent advertisements). PhotoReading is not speed-reading, but rather claims to rely on an unconscious component of the mind. The technique involves first entering a relaxed state of mind, referred to as the *Alpha State* (relaxation generally precedes each PhotoReading phase). At this point the reader consciously decides what knowledge is to be gained from the text. This process is called "stating a purpose" for reading. The reader then previews the text by reading important parts of the book or text such as the table of contents, the index, key words, key phrases, and often entire sections of the text (using normal reading strategies). The reader then completes the *PhotoFocus* stage of the PhotoReading process. First the reader achieves a *Theta State*, a state of profound relaxation that purportedly opens up the right brain and gives the reader access to unconscious memory. The PhotoReader then looks at, but does not focus on or read, each page of a text for a brief moment (about 1 to 2 seconds) with a "soft" or diverged gaze. (The type of focus used is similar to that use for Magic Eye pictures for which the eyes must focus beyond the actual picture.) This PhotoFocus phase is followed by an "incubation" period. The PhotoReader simply waits, while continuing with daily activities, for between 20 minutes and 24 hours. After this incubation period, the information that was presented in the text can be "activated" and consciously used by the reader. Finally,

the reader may "rapid read" the text. Much like speed reading, the PhotoReader scans and reads the text at a rapid rate – skipping familiar sections and slowing down for less familiar, desired information.

The reading rates proclaimed by PhotoReading experts (up to 25,000 words per minute) are indeed amazing. Although speed reading estimates range up to 81,000 words per minute, examinations of speed reading above rates of 600 words per minute have indicated that comprehension is low, or non-existent (e.g., Carver, 1985). Thus, any comprehension of a text at a rate of 25,000 words a minute would be astounding. However, while this technique has received attention in the popular press, there have been no known systematic or scientific examinations of the technique's validity. Indeed, the entire process and purported outcomes contradict most accepted theories of reading comprehension (e.g., Kintsch, 1998). Accordingly, skilled reading involves active, conscious, and strategic processing of the information in a text (e.g., McNamara & Scott; 1999; McNamara & Kintsch, 1996). Learning from a text requires the reader to consciously process the information, the relationships between separate ideas in the text, and to draw inferences that go beyond the information presented in the text. All of these cognitive processes are assumed to be relatively conscious and effortful, and to take time. Thus, according to theories of reading comprehension (e.g., Kintsch, 1998), successful comprehension using the PhotoReading technique should not be possible.

Examination of PhotoReading

The objective of this study was to provide a relatively objective examination of the effectiveness of PhotoReading. To this end, the principal investigator participated in a PhotoReading workshop to learn how to PhotoRead. Parallel versions of two standardized and three experimenter-created reading comprehension tests were administered to the experimenter (i.e., PhotoReading trainee) and to an expert user of the PhotoReading technique. These tests were used to compare the effects of normal reading strategies and the PhotoReading technique on both readers' text comprehension.

PhotoReading

The complete process of PhotoReading involves five phases: preparation, previewing, using the PhotoFocus gaze, activating, and rapid reading. This section describes these five phases. **Preparation** involves entering a focussed, though relaxed state of mind and determining the purpose of reading the material (e.g., application, importance, level of detail needed, time commitment, etc.). Preparation generally requires only a few minutes.

The following phase, **previewing**, involves (a) surveying the reading material, (b) pulling out important words, and (c) reviewing the purpose of reading the material. Surveying the material includes reading information such as the title, subtitles, headings, table of contents, copyright date, index, first and last pages or paragraphs of sections, bolded or highlighted text, information in boxes, figures, or charts, summaries, previews, or review questions. Pulling out trigger words is a continuation of the survey process, but specifically centers on identifying important words in the text. Surveying the material and pulling out trigger words are considered important components of the PhotoReading technique. Indeed, Paul Scheele (1996) states "You may be amazed at how much you can gain through this strategy. In some cases, you will find everything you want to know—just through surveying" (p. 32). Previewing requires a variable amount of time that depends on the amount and difficulty of the written material. For example, a short article should require only half a minute whereas a book should require between 5 and 8 minutes to complete. The final step of previewing is to review reading goals – for example, the reader may decide that all of the needed information has been accessed at this point, and proceed no further. At the same time, the reader may also decide that more information is needed, but redefine the specific information desired.

The third phase, using the **PhotoFocus** gaze, is considered the heart of the PhotoReading process and is also the only phase unique to Scheele's PhotoReading process. Paul Scheele (1996)

claims, "It is the most right-brained and provocative step of this system." (p. 37). Using the PhotoFocus gaze involves six steps. The first step is to prepare by reestablishing the purpose for reading the material. The second step is to enter "the accelerative learning state" by reaching a profound relaxed state of mind called the Theta state (with reference to increased Theta brain waves which are at 4-8 Hz). The third step is to affirm "concentration, impact, and purpose." This phase is much like self-hypnosis. The PhotoReader silently makes self-statements such as "As I PhotoRead, my concentration is absolute." and "All that I PhotoRead makes a lasting impression on my inner mind and is available to me." (Scheele, 1996; p. 40). The PhotoReader then enters the PhotoFocus State which involves looking at (but not focusing on or reading) each page of a text for a brief moment (about 1 to 2 seconds) with a "soft" or diverged gaze. The type of focus used is similar to that use for Magic Eye pictures for which the eyes must focus beyond the actual picture. The goal is to widen peripheral vision and to "mentally photograph" each page. The information is then assumed to be processed at a preconscious level and available directly to "the deeper memory of the inner mind." (Scheele, 1996; p. 42). The fifth step of the PhotoFocus phase is to maintain a steady state while flipping the pages of the text. The reader attempts to maintain the accelerative learning state while remaining relaxed and turning the pages of the text (using the PhotoFocus gaze) at a steady rhythm. Finally, the reader "closes the process with a sense of mastery." The closing process is once again mindful of self-hypnosis. The PhotoReader closes by making self-affirmations such as "I acknowledge the feelings I have received from this book", and "I release this information for my body and inner mind to process."

The PhotoFocus phase generally requires only a few minutes and is followed by an "incubation" period. The PhotoReader simply waits, while continuing with daily activities, for between 20 minutes and 24 hours. After this incubation period, the information that was presented in the text can be "activated" and consciously used by the reader. **Activation** can include a variety of techniques such as questioning, summarizing, making lists, and making mind maps (associative outlines). Activation also includes "super reading and dipping". This process involves scanning the text (in any order) and stopping to quickly read sections that grab the reader's attention. If the PhotoReader has not yet achieved the information desired from the text, the final step of the PhotoReading process is to rapid read. **Rapid reading** is essentially speed reading, except that the reader prepares by entering a relaxed state beforehand. Specifically, the PhotoReader scans and reads the text at a rapid rate – skipping familiar sections and slowing down for less familiar, desired information.

Method

Training

To examine the effectiveness of PhotoReading, the principle investigator (i.e., henceforth referred to as the *trainee*) participated in a two-day workshop provided by an authorized instructor of the PhotoReading technique. The instructor had received training from the originator of the technique, Paul Scheele, had practiced the technique for over 3 years, and had trained approximately 150 individuals to use PhotoReading. The workshop involved practicing each step of the PhotoReading process with a group of nine other students. The trainee studied the technique for a week prior to the two-day PhotoReading training workshop, and followed up the workshop with an individual training session with the PhotoReading instructor after approximately one month. The trainee then practiced the technique over a period of approximately two months.

Design of study

Two subjects participated in this study: (a) the PhotoReading trainee who participated in a two-day PhotoReading workshop, and (b) the PhotoReading expert who provided the PhotoReading workshop. The two participants were first given five reading tests before the workshop for which they used normal reading strategies (i.e., **pretests**). The participants were subsequently given parallel versions of the five reading tests for which they used the PhotoReading technique (i.e., **posttests**).

The readers' performance on the pretests was compared to performance on the posttests. The measures of effectiveness included both accuracy on the tests and the time to read the texts. If PhotoReading is effective, then posttest performance should exceed or equal pretest performance. If PhotoReading is not effective, then pretest performance should exceed posttest performance.

Testing Materials

The reading comprehension tests included parallel versions of two standardized tests and three experimenter-created tests. The standardized tests included the Nelson Denny Reading Comprehension Test (forms G and H) and the Verbal Reasoning section from the MCAT. The Nelson Denny involves answering 38 questions distributed across seven short passages. The standard time limit to complete the Nelson Denny is 20 minutes. The Verbal Reasoning test involves answering 65 questions across nine passages. The standard time limit for this test is 85 minutes. (These time limits were not imposed here). For both tests, the reader can look back at the questions to answer the questions. Thus, reading times include both reading and answering the questions.

The experimenter-created[1] tests were designed to assess the effectiveness of PhotoReading for more difficult, expository texts (see Appendix A for sample texts and questions). These types of tests were of particular interest because PhotoReading has been claimed to be particularly effective for this type of text and because learning from text is an important goal of reading. The original texts were obtained from advanced textbooks (i.e., Kolb & Whishaw, 1996; Levine & Shefner, 1981; Pough, Janis, & Heiser, 1999) and then slightly modified to created parallel versions (for each topic) in terms of difficulty and the number of words. The texts included three general topics: physiology, perception, and biology. For each topic, two texts were used that were comparable in terms of the number of words, reading ease, and estimated grade level appropriateness. These characteristics for each of the six texts are presented in Table 1. Of the two versions created for each topic, one text was chosen randomly to be read normally, the other to be read using the PhotoReading strategy.

Table 1. Characteristics of the six expository texts that were used to compare the effectiveness of normal reading to that of PhotoReading.

Topic	Physiology		Perception		Biology	
Reading Method	Normal	PhotoRead	Normal	PhotoRead	Normal	PhotoRead
Words	1498	1517	1538	1506	1510	1511
Flesch Reading Ease	26.1	31	42.6	37.8	51.8	52.7
Flesch-Kincaid Grade Level	12.0	12.0	12.0	12.0	10.0	10.5

For each of the six texts, 24 open-ended questions were created, including 8 prior knowledge questions, 8 text-based questions, and 8 conceptual questions[2]. The prior knowledge questions were included because it has been well established that prior knowledge plays an important role in text comprehension. Prior knowledge allows the reader to better understand the text by generating knowledge-based inferences to fill in conceptual gaps in the text. In addition, questions may be answered on the basis of prior knowledge of the topic, and not on the exposure to the text. The prior knowledge questions afford an estimation of when this might be the case.

Text-based questions are based on a single idea or sentence from the text. The information in the

[1] The texts and tests were created by a Research Assistant such that the Principle Investigator (i.e., the trainee) had no exposure to the texts and tests prior to the testing time. The two physiology texts and corresponding questions are provided in Appendix A.

[2] Conceptual questions have also been referred to as situation model questions (e.g., McNamara et al., 1996).

text that is targeted by the question generally requires little prior knowledge and little active processing of the text to understand. However, they are more difficult than multiple choice questions because they require recalling, rather than only recognizing the answers to the questions. Conceptual questions are considered to be more difficult than text-based questions because correctly answering them requires integrating separate ideas from the text and understanding relations between concepts presented in the text.

The expert also read three additional chapters from the Physiology textbook (Kolb & Whishaw, 1996). The expert read the material necessary to take the first exam in a graduate-level Physiology course at Old Dominion University. This text was employed because it has been claimed that this method is appropriate to read material and take exams in college courses. The text material necessary for the test included three chapters (approximately 26,350 words). The test was adapted from the exam used by the course instructor and consisted of 6 true/false, 30 multiple-choice, 6 fill-in-the-blank, and 12 short-answer questions. Among these questions were 15 prior knowledge questions.

Procedure

The pretests were read normally by the participants, whereas the posttests were read using the PhotoReading strategy. Within both the pretest and posttest phases, the comprehension test were administered in a fixed order: Nelson Denny, Verbal Reasoning, Physiology, Perception, Biology. The Nelson Denny and the Verbal Reasoning comprehension tests were administered in a single session, and the expository texts were administered in a separate session. Reading times for each text were measured with a stop watch.

Normal reading. The Nelson Denny and Verbal Reasoning tests were administered with the instructions to read them normally and that the reader could refer back to the text to answer the questions. The expository texts were administered one at a time. First, the subject read the text. When the subject was ready to take the test, the text was removed and the questions to assess comprehension of that text were presented to the subject.

PhotoReading. For both standardized tests, the entire Photoreading process was completed in one session -- that is there was not a break to allow for incubation. Thus, the reading times include all processes involved in the PhotoReading process, as well as answering the questions. For the three expository texts, the Preview and PhotoReading processes were completed the day before the testing day to allow for at least 12 hours of incubation. The following day, the texts were presented which were rapidly read. The texts were then removed during the testing phase.

Results

Standardized Tests

Table 2 shows the results for the two standardized subtests, the Nelson Denny and the Verbal Reasoning subtest from the MCAT. For each text, the number of correctly answered questions, the percent correct, and the reading time (including reading and answering the questions) are listed as a function of reader and reading method. The results indicate that there was no benefit for using the PhotoReading method, neither in terms of the number of correctly answered questions, nor the time to complete the test. For both readers, the number correct for the Nelson Denny test was equivalent regardless of whether it was read normally or with the PhotoReading reading strategy. The time to complete the test remained approximately the same for the expert and increased as a function of PhotoReading for the trainee. Thus, there was no benefit of PhotoReading for the Nelson Denny test. The number of correctly answered questions for the Verbal Reasoning test by the expert dropped 6 percent -- accompanied by an increase of 28 minutes in reading time. Although the reading time did decrease for the trainee by 16 minutes, there was a 20 percent decrease in comprehension. Thus, there was clearly no benefit of PhotoReading for the two standardized reading tests.

Table 2. Reading comprehension and reading rate results for the two standardized tests as a function of reader and reading method.

	Expert		Trainee	
	Normal	PhotoRead	Normal	PhotoRead
Nelson Denny				
Number correct	37	38	35	35
Percent correct	0.97	1.00	0.92	0.92
Reading time (min.)	19.43	18.13	15.80	21.30
Verbal Reasoning (MCAT)				
Number correct	54	50	53	40
Percent correct	0.83	0.77	0.82	0.62
Reading time (min.)	69.35	98.03	62.00	46.00

To further examine the relationship between comprehension accuracy and reading time, Figure 1 (on the following page) displays the standardized test results in terms of efficiency. Efficiency is the time spent reading per correctly answered question (i.e., reading time/number correct). This figure shows that there was no increase in efficiency as a function of using the PhotoReading method. Moreover, there was a loss in efficiency for the expert PhotoReader's performance on the verbal reasoning tests – she spent more time completing the test per correctly answered question.

Expository Texts

Figure 1 also shows average performance on the expository texts (i.e., Physiology, Perception, and Biology) in terms of efficiency. For the trainee, there was no change in efficiency. Efficiency remained the same comparing the pretest (using normal reading strategies) and the posttest (using PhotoReading). However, for the expert PhotoReader, there was a substantial loss in efficiency – for all three texts, more time was spent reading per correctly answered question when using the PhotoReading method as compared to reading the texts normally. This loss in efficiency for the expert is displayed in Figure 1 in terms of an average increase of 2.5 minutes reading time per correctly answered question when PhotoReading as compared to reading normally.

Figure 1. Reading efficiency (i.e., total time divided by the number of correctly answered questions) for each of the two standardized tests and the expository texts.

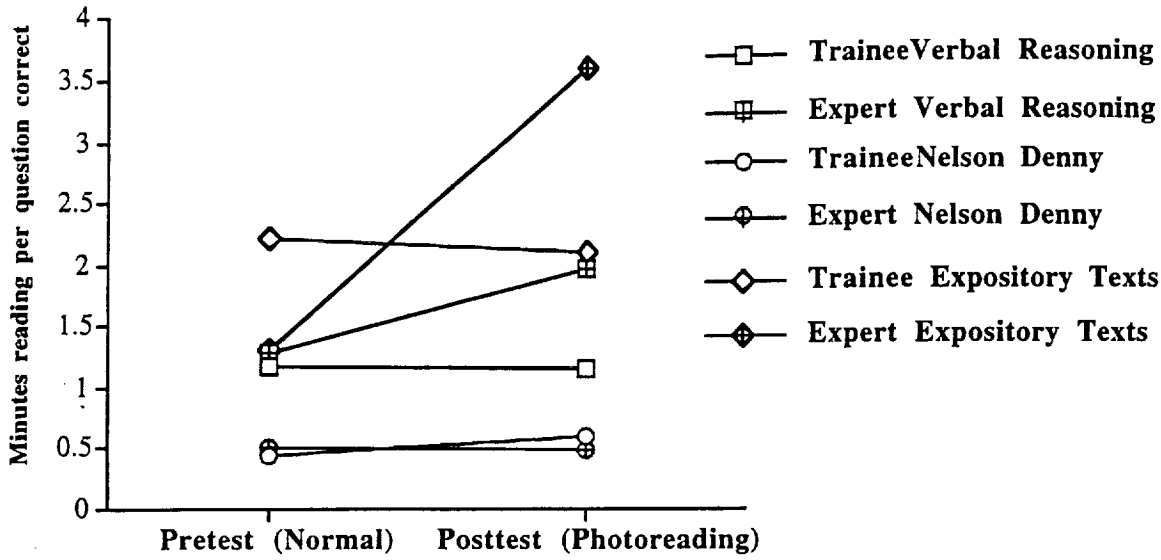


Figure 2 displays average comprehension accuracy for the expository texts as a function of reader (i.e., trainee and expert) and test (i.e., comparing the pretest using normal reading strategies to the posttest using PhotoReading technique). It should be noted that while the overall comprehension performance may seem low for the expository texts, it is normal given the difficulty of the texts and questions. Figure 2 shows that for both readers there was a 20 percent decrease in comprehension accuracy when using the PhotoReading strategy (i.e., the posttest) as compared to when reading normally (i.e., the pretest).

Figure 2. Reading comprehension of the expository texts as a function of reader and reading method.

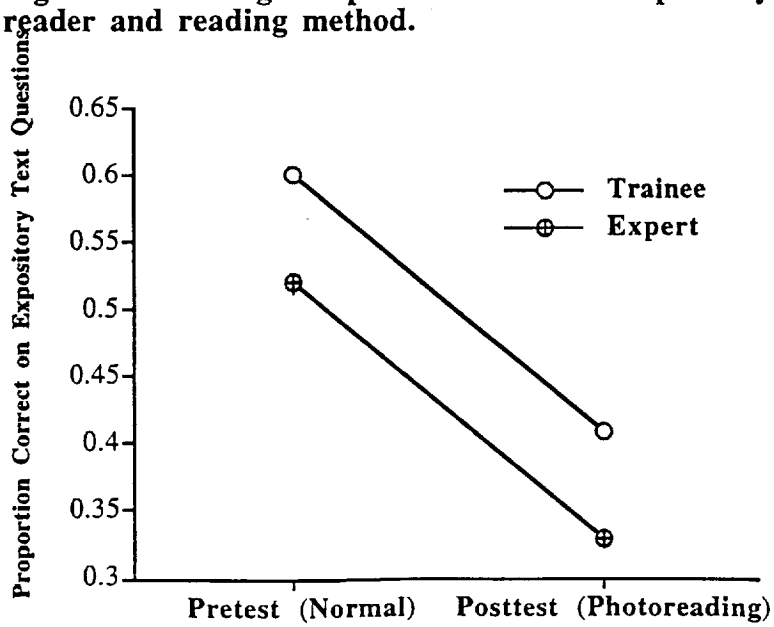


Table 3 shows the test results for the three sets of expository texts in greater detail. For each of the three text domains (i.e., physiology, perception, and biology), the number of correctly answered text-based questions (n=8), conceptual questions (n=8), and prior knowledge questions (n=8) are shown, as well as the total reading time and the time spent PhotoReading (which was included in the total reading time). The following section describes the effects that resulted from differences between reading techniques, question types, readers, and texts.

Table 3. Performance on the three expository texts as a function of reader and reading method.

	Expert		Trainee	
	Normal	PhotoRead	Normal	PhotoRead
Physiology Text				
Text-based	4.5	2.5	3.5	1.5
Conceptual	6	3.8	7	3.5
Prior Knowledge	1	1.5	2.5	4
Total Reading time (min)	10.38	29.25	16.9	12.08
PhotoReading time		0.68		5.1
Words per minute	144.32	51.86	88.64	125.58
Perception Text				
Text-based	3	1	3.5	3.5
Conceptual	2	1	3.5	3.5
Prior Knowledge	0	1	1	3
Total Reading time (min)	8.82	8.12	19.53	12.92
PhotoReading time		0.87		4.2
Words per minute	174.38	185.47	78.75	116.56
Biology Text				
Text-based	4.5	5.5	6	5.5
Conceptual	4.8	2	5.5	2
Prior Knowledge	4	1	2	3
Total Reading time (min)	10.78	15.55	25.63	15.43
PhotoReading time		0.95		5.8
Words per minute	140.07	97.17	58.92	97.93

Reading technique. The primary question addressed in this study regarded the effect of reading technique on comprehension performance. The average effects of reading technique on efficiency and accuracy are displayed in Figures 1 and 2, respectively. As discussed earlier, there was a general loss in both efficiency and accuracy as a function of using the PhotoReading technique. Table 3 shows this data in greater detail. Specifically, there was a decrease in comprehension accuracy as a function of reading technique for every text except the trainee's comprehension of the perception text – for which comprehension remained constant. However, the trainee possessed greater prior knowledge of the text that was PhotoRead than of its parallel (normally read) version. Thus, comprehension of the text that was PhotoRead can at least partially be attributed to the reader's prior knowledge of the text's contents.

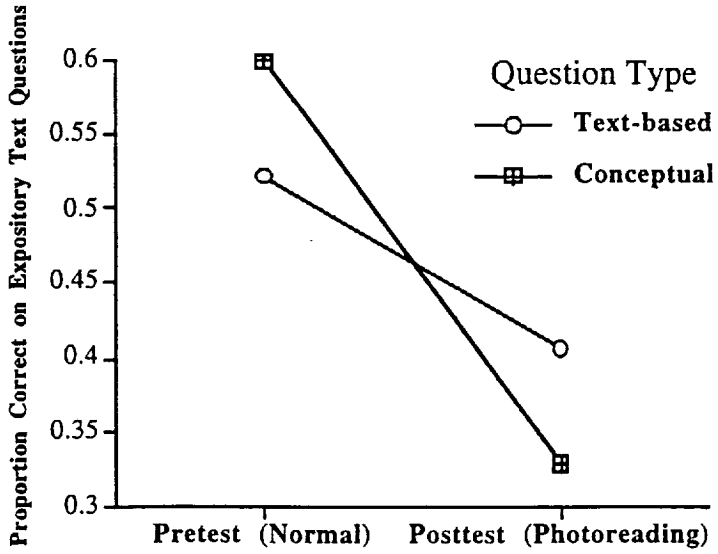
In terms of the amount of time spent reading, the expert PhotoReader increased reading time when PhotoReading for the physiology and biology texts, and showed no change for the perception text. Thus, in terms of both accuracy and reading time, the expert PhotoReader showed a disadvantage for using the PhotoReading technique. In contrast, the trainee showed a decrease in reading time of between 5 and 10 minutes across all three texts when using the PhotoReading technique. This reading time decreased for the trainee when PhotoReading despite the fact that the trainee spent considerably more time in the PhotoFocus phase than did the expert. This time differential was due to the extra time necessary for the trainee to achieve a relaxed state. Of that total time, approximately 1 to 1.5 minutes per

text was spent previewing and PhotoReading the text. Nevertheless, the decrease in reading time for the trainee resulted in a decrease in comprehension accuracy from 69 percent with normal reading to 39 percent when PhotoReading for the Physiology and Biology texts.

In terms of words per minute (wpm) spent reading, there was no difference between normal reading (M=114 wpm) and PhotoReading (M=112 wpm). Indeed, the overall reading times in terms of words per minute may seem quite slow. However the reading times include more than one reading of the text. The readers generally read each text twice, and only stopped reading the text when they felt comfortable enough with the material to take the test. Nevertheless, none of the reading rates approach speed reading rates, and they are far from the estimates of 25,000 words per minute provided in the PhotoReading advertisements. However, it is notable that during the workshop, the PhotoReading instructor admitted that the advertised reading times for PhotoReading are calculated on the basis of the time to complete solely the PhotoFocus phase, and do not include the time to complete the other four phases of the complete PhotoReading process. To provide a comparison, the expert's reading times were calculated using only the PhotoFocus phase, resulting in an estimate of 1873 words per minute. This reading time remains far from the advertised reading rates and is hardly a valid estimate.

Question type. There were two types of comprehension questions: text-based and conceptual. Text-based questions assess memory and understanding of the details and individual concepts, whereas the conceptual questions measure understanding of the relationships between concepts in the texts. Previous research has generally shown better performance on text-based than conceptual questions, whereas in this case there was equivalent performance (i.e., 46 percent) on both types of questions. However, Figure 3 shows that this result depended on reading technique. Performance on the conceptual questions was better than performance on text-based questions when the readers used normal reading strategies, but showed a 30 percent drop in accuracy when the PhotoReading technique was used. In contrast, text-based questions only showed a 10 percent decrease as a result of using PhotoReading. This trend was observed for both readers and indicates that the PhotoReading technique allowed memory and understanding of some details and isolated concepts but little integration of these ideas. Indeed, a substantial decrease in performance on conceptual questions after PhotoReading was observed in every case but one[3]. Thus, the readers' global understanding of the relationships between concepts in the texts suffered more as a consequence of PhotoReading than did memory for isolated details.

Figure 3. Reading comprehension of the expository texts as a function of reading method and question type.



[3] That is, the trainee's comprehension of the perception text for which there was greater prior knowledge available for the text that was PhotoRead in comparison to the text that was read normally.

Readers. The average comprehension accuracy for the expert PhotoReader was 42 percent compared to 50 percent for the trainee. The average reading time for the expert PhotoReader was 11 minutes compared to 20 minutes for the trainee. Thus, the trainee tended to answer more questions correctly, but also tended to spend more time reading.

Texts. The average comprehension of the physiology, perception, and biology texts was 50, 33, and 56 percent, respectively. Thus, the perception texts were less well understood than the other two sets of texts. This decrease in comprehension can be partially attributed to the readers' relative lack of prior knowledge for these texts. Average performance on the prior knowledge questions for the physiology, perception, and biology texts, was 28, 16, and 31 percent correct, respectively. Hence, comprehension performance was directly related to performance on the prior knowledge questions.

Physiology Text Book

The final task given to the PhotoReading expert was to read the three chapters from the textbook on Physiology in order to take an exam from a course that used that textbook. The question was simply: Would she pass the exam? The expert took 73 minutes to PhotoRead and read the three chapters of the textbook required for the test (i.e., 361 words per minute). She PhotoRead for 9 minutes the night before taking the test. The following morning, she read the text using various rapid reading and activation techniques. She then answered the questions. She completed the 6 true/false and 30 multiple choice questions, but did not attempt to answer the fill-in-the-blank or short-answer questions. Hence, comprehension performance on the conceptual questions was 0 percent. She answered 2 of 7 multiple-choice prior knowledge questions correctly (29%). Of the text relevant questions, she answered 4 of 6 true/false questions correctly (67%), and 8 of 23 multiple-choice question correctly (35%). This performance is extremely low and only slightly above chance level performance for these types of questions (i.e., 50% and 25%, respectively). In sum, she did not pass the exam.

It is important to note that after PhotoReading the text (but before taking the test), she rated her understanding of the material as 4.5 on a 5-point scale (5 representing a good understanding). Moreover, she estimated that she would remember approximately 68 percent of the material for the test, with a grade of C+. This high level of confidence in terms of her text comprehension would have remained unshattered had she not then taken the test – after which she rated her comprehension much lower (i.e., 2).

Conclusions

These results clearly indicate that there is no benefit to using the PhotoReading technique. The extremely rapid reading rates claimed by PhotoReaders were not observed; indeed the reading rates were generally comparable to those for normal reading. Moreover, the PhotoReading expert showed an increase in reading time with the PhotoReading technique in comparison to normal reading. This increase in reading time was accompanied by a decrease in text comprehension. These results were found for two standardized tests of text comprehension and for three matched sets of expository texts.

The decrease in reading comprehension as result of using the PhotoReading technique also seemed to depend on question type. Comprehension accuracy decreased 30 percent on the conceptual questions as a result of using the PhotoReading technique, compared to a decrease of 10 percent on the text-based questions. This result makes sense in light of current theories of reading comprehension (i.e., Kintsch, 1998). Accordingly, comprehension on the text-based level requires less effort than does a deeper understanding reflected by performance on the conceptual questions (e.g., McNamara, Kintsch, Songer, & Kintsch, 1996; McNamara & Kintsch, 1996). A deeper, conceptual understanding of the texts requires actively processing the relationships between ideas in the texts by generating inferences while reading – this type of textual processing is not possible when using the PhotoReading technique.

The assumption that there is a lack of active processing during PhotoReading is supported by a recent advertisement produced by Paul Scheele. Included in the PhotoReading advertisements presented in Appendix B, is a "letter" from Paul Scheele presenting a copy of an Electroencephalograph (EEG) of PhotoReading as compared to Regular Reading. This EEG indicates a general lack of brain activity during the PhotoReading process compared to a dramatic increase in activity during normal reading. This increased activity during Regular Reading is interpreted by Paul Scheele as "Mental Chatter", and the absence of activity during PhotoReading as similar to "running through an open field" and processing "information in a way that is more compatible with the tremendous powers of your brain." Contrary to Scheele's interpretation, it is widely accepted that increased brain activity indicates that thought processes are occurring, whereas the lack of brain activity generally indicates an absence of thought processes. According to theories of reading comprehension, reading comprehension should suffer when readers less actively process the text. The results found in this study support this assumption.

Why do so many who practice it claim that PhotoReading is effective? One aspect of the PhotoReading technique is that it leaves the reader with a false sense of confidence. This was particularly evident with regards to the expert PhotoReader's comprehension rating for her comprehension of the physiology textbook. After PhotoReading, she estimated her comprehension as very high, which it was not. She was unable to answer any of the open-ended questions, and answered the remaining questions with poor accuracy. As the trainee, I experienced this false feeling of confidence myself, particularly for the topic texts. After reading each of the texts, I estimated that my comprehension was as good as that for the texts read normally. For each text, after having PhotoRead the text, I read the text quickly using the rapid reading technique that I learned in the PhotoReading course. I then rapid read the text again – at that point believing that I was ready to take the comprehension test. This over-confidence clearly led me astray given the evidence from my low comprehension scores for these texts.

What is the source of this over-confidence? There are two principle factors that may be responsible for this false sense of comprehension: previewing and self-hypnosis. During previewing, the reader may read a wide variety of material in the text such as the table of contents, the index, first paragraphs of sections, tables, graphs, keywords, and so on. This process results in a relatively superficial understanding of the text. However, many details and isolated concepts may be understood and remembered from the text. Thus, previewing can result in a text-based level of comprehension (though not necessarily accurate). In addition, the concepts that are read during the preview phase are *primed*. That is, the exposure to the key words and phrases readies those concepts in the reader's mind for future use. When the reader returns after the incubation period to "rapid read" and "activate" the text, there may be a sense of deja-vue. This feeling of deja-vue is often interpreted by PhotoReaders as literally remembering – which can imply to the reader that the material had been learned during the PhotoReading phase. This priming may have an even larger impact if the reader has greater prior knowledge of the text. Priming will result in a spread of activation to related concepts in memory. If many related concepts are available to the reader in prior knowledge, then the previewing process will result in a greater feeling of understanding the text.

A second factor contributing to the feeling of understanding the text may emerge from the relaxation and self-hypnosis techniques that accompany the PhotoReading technique. That is, before each phase of PhotoReading, the reader relaxes. During this relaxation state, the reader makes self-statement such as "All that I PhotoRead makes a lasting impression on my inner mind and is available to me" (Scheele, p. 40). This inner speech reinforces the assumption that PhotoReading works. Moreover, the reader has made a commitment to the success of the technique (to him or herself) and may be less willing or able to recognize its failure. Its failure would then be in conflict with the reader's self-acclaimed beliefs.

In conclusion, the evidence shown here indicates that PhotoReading does not lead to successful and/or rapid comprehension of written text. The claims of its effectiveness range across all types of reading material, including texts such as those examined here. The focus here was on relatively difficult

texts, and not leisurely reading of fictional novels. One might claim that the technique may be more appropriate for reading fictional material. However, the expert who participated in this study claimed that she would not use this technique to read a novel because it is less enjoyable, primarily because the reader tends to miss the verbal interplay between characters within the novel. In essence, the point of a novel would be lost with PhotoReading. One might claim, particularly in light of the results in this study, that PhotoReading could be appropriate for searching for details (and not global information). However, given the loss in accuracy combined with a lack of substantial time gain, I would not recommend using the technique for this purpose. Moreover, this technique may be detrimental to readers because it instills a false feeling of understanding. PhotoReaders may believe that their reading goals have been accomplished, whereas their goals are probably far from achieved. A PhotoReader may believe that the text has been absorbed, and the reader may indeed remember some of the text's details. However, the source of this memory most likely arises from previewing and rapid reading the text, and not from the PhotoFocus phase of PhotoReading (as claimed by PhotoReading experts). Moreover, it is also doubtful that the memories for the text are highly stable or accurate. Based on the results of this study, there are appear to be no benefits of using the PhotoReading technique.

References

Carver, R.P. (1985). How good are some of the world's best readers? Reading Research Quartely, 20, 389-419.

Kintsch, W. (1998). Comprehension. U.S.: Cambridge University Press.

Kolb, B. & Whishaw, I. Q. (1996). Fundamentals of Human Neuropsychology 4th Edition. United States: W. H. Freeman and Company

Levine, M. W. & Shefner, J. M. (1981). Fundamentals of Sensation and Perception. United States: Addison-Wesley Publishing Company, Inc.

McNamara, D. S., & Kintsch, W. (1996). Learning from Text: Effects of prior knowledge and text coherence. Discourse Processes, 22, 247-287.

McNamara, D. S., Kintsch E., Songer, N. B., & Kintsch W. (1996). Are good texts always better? Text coherence, background knowledge, and levels of understanding in learning from text. *Cognition and Instruction, 14*, 1-43.

McNamara, D. S., & Scott, J. L. (1999). Training reading strategies. Proceedings of the Twenty-First Annual Meeting of the Cognitive Science Society, Hillsdale, NJ: Erlbaum.

Pough, F. H., Janis, C. M., & Heiser, J. B. (1999). Vertebrate Life 5th Edition. New Jersey: Prentice-Hall, Inc.

Scheele, P. R. (1993). The PhotoReading whole mind system. United States: Learning Strategies Corporation.

Appendix A: Physiology Texts and Questions

Normally Read Physiology Text

Emotional Processes: Historical Views

Interest in the biology of emotions dates back to Darwin's book, *The Expression of Emotion in Man and Animals*, published in 1872. Darwin believed that human emotional expression could only be understood in the context of the expressions of other animals because our emotional behavior is determined by our evolution. Although Darwin's book was a best-seller in its time, its influence was short-lived and it was temporarily forgotten. Psychologists began to speculate about emotions at the turn of the century, but they had little knowledge about the neural basis of emotional behavior. By the late 1920's, psychologists began to examine the relationship between autonomic, endocrine, and neurohumoral factors and inferred emotional states, with particular emphasis upon measuring indices such as heart rate, blood pressure, and skin temperature. Philip Bard made one of the first major discoveries while working in Walter Cannon's laboratory in the late 1920's.

It had been known from Franz Goltz's studies in the 1890s that decorticated dogs could show strong "rage" responses to seemingly trivial stimuli; the dogs acted as though a seriously threatening stimulus confronted them. Working with cats, Bard showed that this response depended upon the diencephalon, which includes the thalamus and hypothalamus. He found that if the diencephalon was intact, animals would show strong "emotional" responses, but if the animals were decerebrate, leaving the diencephalon disconnected from the midbrain, they would not.

Later studies by many authors (especially Eckhard Hess in the 1940s and John Flynn in the 1960s) showed that stimulation of different regions of the hypothalamus could elicit different types of "affective responses" such as behavior associated with attack of another cat (piloerection, hissing, baring of teeth) or attack of a prey animal (crouching, whiskers and ears forward, pouncing), including eating the animal. The lesion and stimulation studies on the diencephalon were important because they led to the idea that the thalamus and hypothalamus contain the neural circuits for the expression of emotional behaviors, including both the overt behaviors and the autonomic responses such as changes in blood pressure, heart rate, and respiration. The role of the cortex was seen as being largely one of inhibiting the thalamus and hypothalamus. Conversely, the thalamus was considered to play a role in activating the cortex during autonomic arousal, which presumably would help to direct the emotion to the appropriate stimulus.

A second major idea in the history of the neurology of emotions came in 1937 when Papez proposed that the structure of the "limbic lobe" forms the anatomical basis of emotions. Papez reasoned that the limbic structures acting on the hypothalamus produce emotional states. Although for Papez the neocortex played no part in producing emotional behavior, he did believe the cortex to be necessary for transforming events produced by limbic structures into what we experience as emotions. The Papez theory had the appeal of combining behavioral phenomena having no known neurological substrates with anatomical structures having no known function.

The idea of an emotional brain gained instant broad approval because of the predominance of Freudian thinking in the 1930s. That an ancient, deep part of the central nervous system controls

emotions and instincts unconsciously, with the neocortex producing consciousness, was a concept with natural appeal for a Freudian-based psychology.

A third major finding came in 1939, when Kluver and Bucy announced the rediscovery of an extraordinary behavioral syndrome that had first been noted by Brown and Schaefer in 1888. The syndrome, resulting from bilateral anterior temporal lobectomy in monkeys, included (1) tameness and a loss of fear; (2) indiscriminate dietary behavior, the monkeys being willing to eat many types of previously rejected foods; (3) greatly increased autoerotic, homosexual, and heterosexual activity, with inappropriate object choice (for example, sexual mounting of chairs); (4) hypermetamorphosis, or a tendency to attend and react to every visual stimulus; (5) a tendency to examine all objects by mouth; and (6) visual agnosia. One aspect of this extraordinary behavior was that animals that normally showed strong aversion to stimuli such as snakes or to "threat" states from humans or other animals now showed no fear of stimuli whatsoever. Similar behavior has been seen in other species as well. For example, we once observed a cat with bilateral medial temporal lesions wander into a room housing monkeys. It showed not the slightest concern that the monkeys were screeching at it and throwing things in its general direction. Normal cats would never venture into such a room and would piloerect if they merely looked into a monkey colony.

The Kluver-Bucy syndrome has been observed subsequently in people with a variety of neurological diseases. For example, Marlowe and colleagues reported on a patient with Kluver-Bucy symptoms that resulted from meningoencephalitis (inflammation of the brain and the meninges):

> As regards his visual functions, the patient seemed unable to recognize a wide variety of common objects. As a result, he exhibited difficulty in the spontaneous employment of tools and other mechanical devices, but could initiate utilization of such objects by imitating the gestures of others, and could care for at least some daily needs in this way. However, his ability to match simple pictures, geometric designs, letters of the alphabet and objects was demonstrably preserved when the tasks were taught non-verbally. Visual orientation was defective, the patient losing his way around the hospital when unattended, and visual distractibility was prominent; he seemed unable to distinguish between relevant and irrelevant objects and actions.
>
> He exhibited a flat affect, and, although originally restless, ultimately became remarkably placid. He appeared indifferent to people or situations. On occasion he became facetious, smiling inappropriately and mimicking the gestures and actions of others. Once initiating an imitative series, he would perseverate copying all movements made by another for the extended periods of time.
>
> He engaged in oral exploration of all objects within his grasp, appearing unable to gain information via tactile or visual means alone. All objects that he could lift were placed in his mouth and sucked or chewed. Hyperbulimia [excessive, insatiable appetite] was prominent; he ingested virtually everything within reach, including the plastic wrapper from bread, cleaning pastes, and feces. Although his tastes were clearly indiscriminate, he seemed to prefer liquids or soft solids.
>
> Although vigorously heterosexual prior to his illness, he was observed in hospital to make advances toward other male patients by stroking their legs and inviting fellatio by gesture. Although on a sexually mixed floor during a portion of his recovery, he never made advances toward women.

The appearance of the Kluver-Bucy syndrome apparently requires that the amygdala and inferior temporal cortex be removed bilaterally. H. M., the amnesic patient described in Chapter 16, does not exhibit the syndrome despite bilateral removal of the medial temporal structures. Furthermore, monkeys with bilateral amygdalectomies do not show the Kluver-Bucy syndrome unless the temporal cortex is also removed.

At about the time of Kluver and Bucy's discovery, a less dramatic, but in many ways more important, discovery was made. Jacobson studied the behavior of chimpanzees in a variety of learning tasks following frontal lobe removals. In 1935, he reported his findings on the effects of the lesions at the Second International Neurology Congress in London. He casually noted that one particularly neurotic chimp appeared more relaxed following the surgery, leading a Portuguese neurologist, Egas Moniz, to propose that similar lesions in people might relieve various behavioral problems. Thus was born psychosurgery and the frontal lobotomy! Unbelievably, not until the late 1960s was any systematic research done on the effects of frontal lobe lesions on the affective behavior of nonhuman animals. Hence, frontal lobotomies in humans were performed without an empirical basis. Experiments by several laboratories have now clearly shown that frontal lobe lesions in rats, cats, and monkeys all have severe effects on social and affective behavior.

The Nature of Emotion

Emotion is not a thing but an inferred state that has many components, each of which, in principle, may be quantified. Historically, theories of emotion have recognized this, and most theorists agree that the concept of emotion includes at least three principal components. First, there are physiological components that include central and autonomic system activity and the resulting changes in visceral activity, as well as neurohormonal activity. Hence, there are changes in heart rate, blood pressure, distribution of blood flow, and perspiration, among others, as well as the release of various hormones that may affect the brain or the autonomic system. Second, there are distinctive overt behaviors that are associated with emotional states. Examples are facial expressions, tone of voice, and posture. These behaviors are especially important to others because they convey information that can be different from what we verbalize. Third, there are cognitive processes that are inferred from self-report. These processes include both subjective feelings such as, love or hate and other cognitions such as plans, memories, and ideas. The theoretical distinction between the three components of an emotional experience is significant because there appears to be little correlation among the three when they are all measured in the same subjects.

Questions for Normally Read Physiology Text

Text-based Questions[4]

1. Why did Darwin believe that researchers need to study animals in order to discover more about human emotional expression?
4. Describe what decerebrate means.
5. What did the lesion and stimulation studies show about the relationship between the thalamus and hypothalamus and the expression of emotional behavior?
10. Why did Papez's theory have so much appeal?
16. What eating disorder was prominent in Marlowe's patient?
20. What two types of behavior do frontal lobe lesions have an effect on?
22. Why is there such a large theoretical distinction between the three components of emotions?
23. What changes in behavior did Jacobson notice in one of his chimps following frontal lobe removal and what type of surgery developed from this discovery?

Conceptual Questions

2. Damage to what area(s) of the brain leads to a strong "rage" response in animals to seemingly trivial stimuli?
7. Describe the two-way relationship between the cortex, thalamus, and hypothalamus.
8. What two areas, according to Papez, are responsible for producing emotional states and what we experience as emotions?
11. Name four symptoms of the Kluver-Bucy syndrome.
13. Symptoms of Kluver-Bucy syndrome are seen after damage to the brain.
    Unilateral or Bilateral (circle one)
14. How did Marlowe's patient compensate for his visual agnosia?
17. Give a brief description of how researchers know that both the amygdala and inferior temporal cortex are related to Kluver-Bucy syndrome.
19. What are the three principal components of emotion?

Prior Knowledge Questions

3. What does a measure of galvanic skin response actually measure?
6. What does the term "sham rage" refer to?
9. What is a lesion?
12. What area of the brain does the neocortex refer to?
15. What are meninges?
18. What is an agnosia?
21. What is an orbitofrontal lobotomy?
24. What type of functions is the central nervous system responsible for?

---

[4] Numbers refer to the order in which the questions were presented to the participants. Questions were randomly ordered.

PhotoRead Physiology Text

Candidate Structures in Emotional Behavior

One of the consistent principles of neural organization is that there are multiple systems controlling virtually every behavior. Sensory information enters the cortex through multiple channels that have distinctly different roles in sensory analysis. Once in the cortex, information travels through multiple parallel systems subserving different functions. Recall that visual information follows a ventral route through the temporal lobe and a dorsal route through the parietal lobe. It is likely that there are also multiple systems, both cortical and subcortical, that contribute to the experience of an emotion. For example, there must be systems that process significant social stimuli, which are presumably species-specific, including olfactory stimuli, tactile stimuli, visual stimuli, and auditory stimuli. Although it could be argued that these stimuli are processed by the same systems that analyze other sensory inputs, there is good reason to believe that there may be at least some separate systems. Olfaction provides a good example.

Many mammals have a receptor organ, known as Jacobson's organ, that is specialized to analyze species-typical odors. When animals such as cats encounter certain odors they close their nostrils and appear to stare off into space, a behavior that is known as flehmen. Actually, the cats are forcing the air through the mouth and into a special duct (which allows the air access to Jacobson's organ) that is connected to the accessory olfactory system. Virtually the only odors that produce this behavior in cats are certain ones from other cats, including urine and ear wax. This system is thus specialized for species-typical odors. One interesting property of this system is that it shows habituation, and cats appear able to remember the odors of familiar cats. Thus, they do not show flehmen to their own urine or to that of cats they live with. Although there is little evidence of such specialized systems for other senses, there is still evidence of special processing. There are cells in the temporal lobe of monkeys that are specially tuned for species-typical calls; these cells are relatively insensitive to other sounds. Recall too that there are temporal cortical cells that are specialized for faces.

In addition to the possible specialized processing of emotionally relevant sensory information, it is possible that there are higher-level systems that process other aspects of this information. Perhaps there is a unique system for cross-modal matching of prosody and facial expression. In addition to multiple systems that may encode specific species-typical information, there may be a general cortical system that is involved in identifying "affective" attributes of stimuli. An interesting experiment by Gazzaniga and Le Doux illustrates such a system. They presented split-brain subjects with visual information to one or the other visual field. The subjects' task was to describe the stimulus verbally and to give it a rating on a five-point scale from "dislike very much" to "like very much." The results were striking. As expected, only the items in the right visual field (and therefore sent to the left, speaking, hemisphere) were described accurately. In contrast, the rating was identical for stimuli in each visual field. Clearly, the pathways that process the affective significance of the stimuli are distinct from the pathways that process their objective properties. This distinction is reminiscent of the difference between knowing what a stimulus is and knowing where it is, as illustrated by blindsight. There may be a third system that processes "subjective feeling" about a stimulus independent of where or what it is. We have all had the experience of recognizing an odor or a sound, even though we cannot identify what the stimulus is. We may say that we have a "feeling" or "intuition" about the stimulus. This affective system may be important for memory and, since it probably involves the amygdala, it may account at least partly for the role of the amygdala in memory.

The analysis of multiple channels in the sensory systems has identified various properties of sensory experiences that appear to form separate processing modules. Color, orientation, motion, and depth all appear to be independent visual stimuli. Applying the concept of multiple neural systems to emotion has the distinct disadvantage that we have not identified modules that appear to be processed

differently. Nonetheless, it seems likely that autonomic stimuli form a distinct module, and the neural circuitry of this module is well known. The dimensions of other components remain to be determined. It seems likely, however, that there are separate modules for different aspects of behavior (for example, facial expression, prosody) and perhaps for cognitive processes as well.

Studies of Nonhuman Primates

The study of nonhuman subjects has made it possible to identify various brain regions that undoubtedly have a significant role in emotional processes. During the past 20 years, studies have been conducted on several species of Old World and New World monkeys with lesions of the frontal cortex, paralimbic cortex, or amygdala--the structures that now appear to be the forebrain areas most important in emotional behavior. The results of such studies show six consistent changes in emotional behavior after frontal lesions.

First, there is an overwhelming consensus that there is a reduction in social interaction following frontal lesions, especially following orbital frontal lesions. Following such lesions, monkeys become socially withdrawn and fail even to reestablish close preoperative relationships with family members. Anterior temporal lesions produce a milder version of this syndrome, reducing social grooming and social interaction with conspecifics. Second, there is a loss of social dominance following orbital frontal lesions: monkeys that were previously dominant in a group do not maintain their dominance after their operations. The rate of fall from dominance probably depends upon the aggressiveness of other monkeys in the group.

Third, monkeys with orbital frontal lesions show inappropriate social interaction. For example, females with such lesions may challenge and threaten unfamiliar male monkeys, whereas normal females typically exhibit gestures of submission in response to dominance gestures displayed by unfamiliar males. Fourth, monkeys with large frontal lesions show a change in social preference. When a normal monkey is released into a large enclosure that has conspecifics behind a glass barrier, it will generally sit against the glass next to an animal sitting on the opposite side. Although normal animals prefer to sit beside intact monkeys of the opposite sex, monkeys with frontal lesions prefer to sit with other frontal monkeys of the same sex, presumably because they are less threatening.

Fifth, monkeys with frontal lesions and those with anterior temporal lesions largely lose the use of their facial expressions, posturings, and gesturings in social situations--the effects being larger after frontal than after temporal lesions. Thus, monkeys with frontal lesions show a drastic drop in the frequency and variability of facial expressions and are described as "poker-faced." Finally, lesions of the frontal or anterior limbic cortex reduce spontaneous social vocalizations. Indeed, following anterior cingulate lesions, rhesus monkeys effectively make no normal vocalizations at all. Curiously, the nonvocal social behavior of these animals is normal.

The changes in emotional processes in monkeys with frontal lesions are especially intriguing because they suggest that similar changes might be found in humans with frontal lobe injuries. In particular, since monkeys fail to make appropriate vocal and gestural behaviors and fail to respond normally to those made by conspecifics, one might predict that humans with frontal lobe injuries would show similar abnormalities.

In the 1930's, clinicians were reporting detailed observations of patients with large unilateral lesions, noting an apparent asymmetry in the effects of left and right hemisphere lesions. The best-known descriptions are those of Goldstein, who suggested that left hemisphere lesions produce "catastrophic" reactions characterized by fearfulness and depression, whereas right hemisphere lesions produce "indifference." The first systematic study of these contrasting behavioral effects was done by Gainotti in 1969, who showed that catastrophic reactions, occurred in 62% of his left hemisphere sample, compared with only 10% of his right hemisphere cases. In contrast, indifference was commoner in the right hemisphere patients, occurring in 38%, as compared with only 11% of the left

hemisphere cases. Significantly, however, Gainotti reported that catastrophic reactions were associated with aphasia and indifference reactions with neglect.

In general, right hemisphere excisions appear to increase talking, left hemisphere lesions reduce it. These effects are especially obvious following frontal lobe lesions. The content of the speech released by right hemisphere is significantly affected by the lesion site. Patients with right frontal lesions characteristically make poor jokes and tell pointless stories, often liberally embellished with profanity. Further, the right frontal lobe patient is usually intensely amused by the stories he or she is telling and will persist even if other are unmoved by them. On the other hand, lesions of the right temporal and/or posterior parietal lobe produce a totally different type of speech that is characterized by excessive concern for the individual's personal life. Many of these patients also exhibit symptoms of paranoia, often being convinced that friends or family either are not supportive or are against them. However, a left-right distinction is far too simple; both the site and the side of the lesion are important in understanding the changes in emotional behavior.

Questions for PhotoRead Physiology Text

Text-based Questions[5]

1. What is one of the consistent principles of neural organization?
6. Researchers have found that there are temporal cortical cells that are specialized for processing _____?
8. Items presented in which visual field are more likely to be described accurately?
11. What disadvantage is there to applying the concept of multiple neural systems to emotion?
13. What three structures of the forebrain appear to be the most important areas in emotional behavior?
15. What type of gestures does a normal female primate show in response to dominance gestures displayed by unfamiliar males?
18. Left hemisphere lesions produce _____ reactions whereas right hemisphere lesions produce _____ reactions.
22. What are the two factors that researchers have found are important in understanding the changes in emotional behavior?

Conceptual Questions

2. Why do researchers believe that there are multiple systems that contribute to the experience of emotion?
4. Describe what behavior "flehmen" refers to and what purpose it serves.
9. Describe how researchers studied or found that, "the pathways that process the affective significance of the stimuli are distinct from the pathways that process their objective properties."
14. List the four of the six consistent changes found in emotional behavior following frontal lesions.
16. What do studies of primates with frontal lobe lesions lead researchers to believe would happen to humans with frontal lobe lesions?
17. What do the six consistent changes found in emotional behavior following frontal lesions all have in common?
20. According to the passage, how do researchers study what processes are controlled by the left hemisphere as compared to what processes are controlled by the right hemisphere?
23. Compare and contrast verbal behavior of patients with right frontal lesions and patients with right temporal and/or posterior parietal lobe lesions.

Prior Knowledge Questions

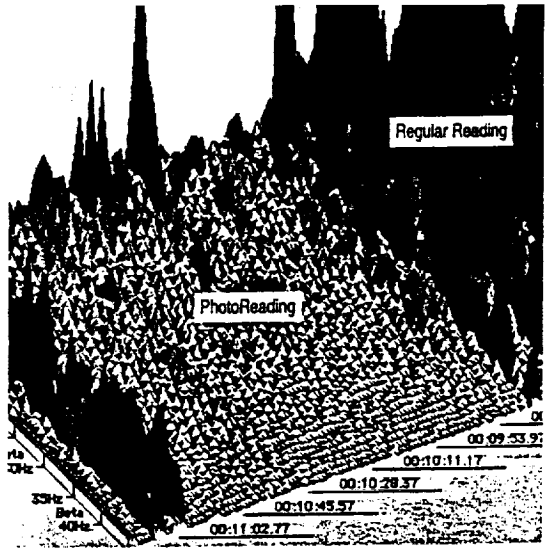
3. What type of processing is the ventral route responsible for?
5. Describe the process of habituation.
7. Which hemisphere is responsible for processing facial expressions (for both recognition and formation of facial expressions)?
10. What is blindsight?
12. What does "columnar organization" refer to?
19. Describe contralateral neglect.
21. What does the concept of "double dissociation" refer to?
24. What is a commissurotomy?

---

[5] Numbers refer to the order in which the questions were presented to the participants. Questions were randomly ordered.

Appendix B: Recent PhotoReading Advertisements

Your brainwave activity changes immediately when you PhotoRead
allowing greater speed and focus



Electroencephalograph provided by IBVA Technologies

Dear Friend,

You can see in the above chart how brainwave activity instantly changed when a student began PhotoReading during a special session taped for a United Film & Television documentary called "Genius."

The dark areas show brainwave activity while the student was "regular" reading. The lighter area shows activity while the student was PhotoReading. Notice how the change happened immediately. It is like plodding through a dense forest and then running through an open field. "Mental chatter" disappeared as the PhotoReader instantly expanded the capabilities of his mind.

This highlights yet another way that PhotoReading is different than regular reading and different than speed reading. PhotoReading allows you to process information in a way that is more compatible with the tremendous powers of your brain.

With that said, the true power of PhotoReading does not come from some fancy chart, but from using the system. PhotoRead to build knowledge and you will earn rewards such as more time, money, respect, and confidence.

Paul R. Scheele

L-PR"EEG"1198

Be honest

You don't have time to do everything you want ... especially reading.

But, if a regular guy like me can get through a couple hundred books in a year *and* have time for other pursuits, then you can, too.

I am fortunate, because I know how to do something that may cause you to salivate. I can consume vast amounts of printed information with the same ease as drinking water. And, if you are willing, I can easily teach you.

Portions of this letter will probably seem beyond belief. Let me assure you it is all true. And, if it is true for someone, then maybe it can be true for you. I just ask that you humor me and read this entire letter if for no other reason than to see what the commotion is about.

Introducing a successful, no-nonsense way to create more time, money, & respect

Dear Friend,

"What if you could go through a book as fast as you could turn the pages?" my friend Paul Scheele asked me. I immediately thought of all those books I had never read, and I got excited. I told him if that were true, it was time for a career change.

Now thirteen years later, over 150,000 people have learned the remarkable "PhotoReading whole mind system" through the book, self-study course, or live seminar. It is taught in a dozen languages in cities around the world.

People learn PhotoReading, because they know life can be better than it is.

PhotoReading works because it uses Neuro-Linguistics and Accelerative Learning to expand the capabilities of your mind.

When you hear the stories about PhotoReading, you may say "No, that is not possible." I just ask that while you read this letter, you hold open the possibility that it might be true.

After all, knowledge from reading is power to earn more, be respected by your peers, and form deeper bonds with those people important to you.

"A breakthrough with the subconscious mind" reports Success Magazine

Your conscious mind can handle seven pieces of information at a time, while your subconscious mind can handle a staggering 20,000 pieces of information. That's the difference between regular reading and PhotoReading. We don't like using the word "subconscious" because it seems mysterious. We take the mystery out of the subconscious, and we help you expand the capabilities of your "whole" mind. Can you imagine the power your whole mind can bring to reading?

Better grades, sharper thinking, increased productivity

- The teacher wrote "A+, Brenda. your writing style improved dramatically overnight. What did you do?" She PhotoRead a selection of books and wrote her term paper. Apparently, her mind assimilated the writing styles of the authors, which helped **transform** her own **writing style.**
- A group of computer programmers at American Express PhotoRead a 35-page highly technical report in minutes. The next day they covered the important facts in **record time**. Normally, it would have required hours of reading (which few ever did) and a lengthy meeting.
- While cross-examining an expert witness, an attorney's intuition told him to challenge the witness's pivotal point. His questioning caused the witness to recant his testimony. All the information the attorney needed and used was in a text he had quickly **PhotoRead at a page per second** the night before.
- Everyone in the office of a firm in New Zealand spent a few minutes PhotoReading time management books. Within a month they measured a significant **improvement in productivity.**

Do you see how PhotoReading is much more than a reading improvement program?

The secrets of PhotoReading...

PhotoReading exposes printed materials to the brain at phenomenal rates, a page per second–all beyond the conscious mind's processing capability, but within the capabilities of the subconscious. Now, re-read that sentence to make sure you got it. It is a wild concept. We actually teach you to "mentally photograph" the printed page at 25,000 words per minute. (Remember, you promised to keep an open mind.)

> "PhotoReading appears to be a natural step forward in the evolution of human reading skills."
> *The Einstein Factor* by Win Wenger

Paul Scheele is an international expert in human performance. His acclaimed work has led to a breakthrough in reading that is **easy for anyone to apply.** As a matter of fact, as a beginning PhotoReader you will absolutely be able to process and understand any printed material three times faster than you can right now–that's where you will start out!

PhotoReading requires a willingness to explore something different. One of the reasons people in emerging countries such as Hungary and Mexico have embraced PhotoReading is they realize they have to do something different to catch up with other countries. You may be getting by, but to thrive in the coming millennium with the deluge of information, you absolutely will have to do something different, otherwise you will be passed by. Think of where you would be today if you had not opened up to the personal computer.

PhotoReading balances a series of reading techniques proven in university studies with the breakthrough technique of "mentally photographing" printed pages. That combination allows you to use the best of your current reading skills, coupled with the best of PhotoReading, to **handle your reading needs immediately**.

And you can use PhotoReading on all types of material and on all subjects from gardening to geophysics, philosophy to calculus, computer manuals to the morning newspaper.

PhotoReading does not give you a photographic memory nor instant recall of everything. It simply makes printed material faster to process and easier to use.

(How are you doing? Are you a little skeptical? The Minnesota Department of Education was extremely skeptical when they reviewed PhotoReading during the process of licensing us as a Private School in 1986. Know that PhotoReading is based in fact, not fantasy. When President Kennedy announced that man would be on the moon by the end of the decade, many thought he fantasized. They didn't know what space scientists knew; if they had, they would have believed in the goal from the beginning. Similarly, if you knew what cognitive scientists know, you would enroll in a PhotoReading class this instant.)

Learn PhotoReading in a few hours

If you buy the self-study course, you will PhotoRead a dictionary, think of any word, and know where it is on the page–on the first tape!

The live weekend class enjoys a **96% success** rate, which means virtually everyone can PhotoRead. All you have to do is decide to do it today.

You receive:
- Increase speed & comprehension
- Useful time management strategies
- Stress reduction

See the enclosed brochure for details...

The 5 Steps of the PhotoReading Whole Mind System

The PhotoReading technique is part of a greater system, called the PhotoReading Whole Mind System, which makes it very practical for every day use:

1) The first step of the PhotoReading Whole Mind System is to **prepare** by stating a clear purpose and getting into an ideal state of mind for reading.
Too many of us read as if our minds only had one gear. Before we start to read, we should be aware of what we want to find out. It also helps if you have entered a state of mind that switches on the whole mind–you will be able to do that with the amazing Tangerine Technique!

2) Then **preview** the materials so that your brain learns how to sort the information that will soon be absorbed by PhotoReading.
"Time spent in reconnaissance is seldom wasted," my dad remembers this from the navy manuals. It is the same in reading. Using PhotoReading preview techniques, your mind lays down a mental grid onto which the data you PhotoRead flows.

3) Your brain absorbs information through **PhotoReading.**
PhotoReading literally teaches you to look at a book differently. You enable your whole mind to absorb information as you flip through your reading material at one page per second.

4) Various **activation** techniques help you process and understand information so that you can use it on a day-to-day basis.
A beginning PhotoReader can get through a book that now takes you 10 hours to read in just three hours. During that 3-hour period you spend only a few minutes PhotoReading. The rest of the time is spent in activation so that you fully understand the material. Using the PhotoReading whole mind system you can absolutely get through material three times faster than you can now. And, that's just the beginning!

5) **Rapid reading** allows you to build even greater comprehension and understanding from a book.
Now and then you will apply Rapid Reading to your material depending on your purpose and the material's complexity. While this technique comes close to regular reading, the level of comprehension it facilitates surpasses what you could ever get from regular reading.

(Have you noticed how I haven't used the words speed reading? **PhotoReading is nothing like speed reading.** Instead of requiring you to move your eyeballs faster, *PhotoReading enables you to use your brain more effectively.*)

Corporate America Is Opening Up To PhotoReading

People from companies such as American Express, Apple Computer, AT&T, Bemis, Bristol Meyers, Cray Research, Digital, EI Dupont, Fingerhut, General Mills, Honeywell, IBM, Pillsbury, 3M Company, US Sprint, US West and many, many more have welcomed this way to process the printed page. It is apparent to them that accessing the whole mind through PhotoReading is necessary.

**Immediate Results you can expect

- Process and understand any book at least three times faster than you can now.
- Do the same with magazine and journal articles.
- Handle incoming mail swiftly and promptly.
- Make informed decisions with every piece of printed material.
- Be more relaxed and confident when reading.
- More pleasure from pleasure reading.

CBS Television News and The Learning Channel featured PhotoReading

Take advantage of our SPECIAL OFFERS

"As a business owner I am always looking for ways to increase my sales. I PhotoRead marketing books that I hadn't found time to read, and then put together a new sales piece that yielded twice what I had done before." John DuCane, publisher, St. Paul, MN

✔ Order the *PhotoReading Personal Learning Course*–save right away with the special discount certificate enclosed. This self-study course gives you the flexibility to learn PhotoReading at home or work. It includes a copy of Paul Scheele's definitive book on PhotoReading. Details are enclosed. Use PhotoReading to create more time, income, respect, and power for yourself.

✔ Enroll in a PhotoReading seminar. This is the best of all worlds, because it gives you hands on experience under the careful guidance of a trained and certified instructor. You also have **free telephone access to coaches** for assistance when you finish the class. **Enroll today and receive Paul's book absolutely FREE.** A schedule is enclosed.

The easiest thing to do is take action right this minute. If you don't, something else will grab your attention, and you may never achieve the benefits of PhotoReading. If you are at all intrigued, then order right now.

Your **money-back, satisfaction guarantee** and **free telephone/email coaching** make it risk-free and worth trying right now.

As we celebrate nearly 20 years of service, Paul Scheele, the staff of Learning Strategies Corporation, the 70 instructors worldwide, and I invite you to bring the power of PhotoReading into your life. *You will be amazed at what you can do.* Call us with any questions or visit us on the Internet at www.PhotoReading.com. To order or enroll today call us at 800-735-8273.

My Personal Best,

Pete Bissmette

Pete Bissonette
President

P.S. When you commit today to learn PhotoReading through the live seminar or the self-study course, I promise:

1) You will experience a *practical* and *interesting* course that will affect the way you think about and use information.

2) You will greatly improve how you process information *immediately*.

3) You will find the benefits of the course to be *worth your investment* of time and money.

And, your satisfaction is guaranteed, or your money back.

"I wrote a novel in three days, thanks to the PhotoReading whole mind system." Ron Cyphers, Denton, Texas

"After PhotoReading a series of books, it is like sitting in front of a panel of experts and being able to shoot questions to them." Huy Nguyen, Process Development Engineer, 3M, St. Paul, Minnesota

"30 books a month every month since I learned PhotoReading 1-1/2 years ago." Mike Kilgore, Clearwater, Florida

"Reading had always been a struggle, but life is different now." Dave Lambert, Pacific Palisades, California

Learning Strategies Corporation
900 East Wayzata Boulevard • Wayzata, Minnesota 55391-1836 USA
612-476-9200 • 800-735-8273 • FAX 612-475-2373
Orders@LearningStrategies.com • Info@LearningStrategies.com

Learning Strategies Corporation is licensed by the Minnesota Department of Education/Higher Education Services Office as a Private School to teach PhotoReading.
"PhotoReading" is a trademark of Learning Strategies Corporation. ©1998 L-PR "Be Honest" 1198