6. Development of Grounded Theories of Complex Cognitive Processing: Exhaustive Withinand Between-Study Analyses of Think-Aloud Data

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Development of Grounded Theories of Complex Cognitive Processing: Exhaustive Within- and Between-Study Analyses of Think-Aloud Data

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I am going to begin with claims that may seem heretical at the Buros Institute, the host for this symposium: Much can be understood about cognition and its metacognitive regulation through qualitative analysis. Qualitative analyses of complex cognitive and metacognitive processes makes a great deal of sense before even attempting quantitative analyses of those processes. In particular, I am going to explain here the advances made by my associates and me in understanding skilled reading using the method of constant comparison, a qualitative approach for developing what Strauss and Corbin (1990) refer to as grounded theories. If that does not offend Buros regulars, perhaps the types of data used as input to the theory construction process will. I believe, as do others (see Ericsson & Simon, 1993), that the most telling analyses of complex, conscious, self-regulated cognitive processes have been produced using verbal protocol procedures—that is, when people have thought aloud as they performed complex tasks. My associates and I have been using verbal protocols of reading to develop grounded theories of consciously regulated reading.

Given that preconceptions do influence research, it is important to lay out one’s assumptions and understandings about a to-be-researched problem at the outset of the study and to audiences who
must evaluate the work. Thus, I begin this chapter by laying out briefly my theoretical sensitivities before I conducted the research reported here, an essential step in qualitative analyses. They included a history of success with both verbal protocol analyses and grounded theory approaches, a long-term interest in reading comprehension, some successes in studying it using traditional quantitative, experimental approaches, but also some important frustrations doing so.

After laying out my preconceptions, I will cover a specific verbal protocol study conducted by my colleagues and me in which constant comparison was used to develop a grounded theory of how social sciences professors read research articles in their areas of expertise. This will be followed by a discussion of how Pressley and Afflerbach (1995) used constant comparison to generate a more general grounded theory of the conscious processes in reading. They used all of the data generated in verbal protocol studies published to date, with the result a grounded theory that is a qualitative meta-analysis of the verbal protocols of reading reported to date. I will conclude the chapter with a brief discussion of the implications of the work reviewed here for future individual research projects on conscious processing during reading, the development of standardized measures of reading comprehension skill, and the construction of more complete grounded theories of complex cognition and behavior.

BACKGROUND: MY THEORETICAL SENSITIVITIES AS I EMBARKED ON THIS RESEARCH

Beginning with my earliest research, I have been interested in the strategies people use to accomplish academic tasks, and in my second year of graduate school I discovered the power of verbal protocols to reveal cognitive processes, many years before Ericsson and Simon’s (1984) book made the approach more respectable in the eyes of many research psychologists. In particular, Pressley and Levin (1977) asked students in grades 5 through 9 to talk aloud as they studied paired associates in anticipation of a memory test. We demonstrated in that work a clear developmental shift in the likelihood that students would verbally elaborate paired associates as they studied—that is, embed word pairs in a meaningful sentence. Especially striking was that whether and how much students reported elaborating was a much better predictor of objective memory performance than age, a satisfying outcome for us at the time given our theoretical conviction that Jenkins (1974) was correct, memory depends much more on what one does to remember than on other factors. Pressley and Levin
(1977) were widely cited and this was considered one of the best contributions I made in the area of memory development. The acceptance of that work did much over the years to convince me personally of the value of the think-aloud approach.

Since my graduate school days, I also have been interested in how cognitive strategies can and do mediate learning of text (Pressley, 1976, 1977). Although most of my research in the decade following graduate school was not concerned with text processing, I returned to the study of comprehension processing in the late 1980s. Using a variety of qualitative methodologies, including ethnographies, interview studies, and case studies (e.g., Pressley et al., 1992) my group made fairly rapid progress in our efforts to understand how elementary students can be taught comprehension strategies. That qualitative methods produced rapid understanding of high quality comprehension instruction, work that has been applauded in many ways, fueled my enthusiasm for qualitative research.

As my students and I tackled the problem of comprehension strategies instruction in the elementary grades, we also began research on adults' naturalistic processing of text. On the positive side, we had some success using quantitative methods to document that college students often are not aware whether they have learned text content they have studied (Pressley, Snyder, Levin, Murray, & Ghatala, 1987) or even when they have completely missed the point of something they have read (Pressley, Ghatala, Woloshyn, & Pirie, 1990a, 1990b). That is, we were able to document somewhat surprising monitoring failures in adult readers—surprising, at least, from the perspective of those who believed that comprehension monitoring failures were more a problem of childhood than adulthood (Markman, 1981).

With the successes came some frustrations, however. For example, Barbara Snyder's master's thesis with me at Western Ontario involved a number of well-controlled, quantitative comparisons of students' overt behaviors as they read from a textbook in use in one of their courses. We presumed that this would be a window on the nature of skilled reading. That proved not to be true. The only conclusion that we could draw from the study was that college students do a great deal of beginning-to-end rereading as they study textbook chapters. Although this finding pointed out a disturbing quality of college student reading, and it is a result that has proven replicable and continues to disturb those who worry about the efficiency of college student study (Cordon & Day, 1995), it seemed to Barbara Snyder, me, and reviewers of the paper resulting from the study, that much more must be going on. I suspected that the
impressive text representational abilities of college students that had been documented by Kintsch (e.g., 1982, 1983, 1988, 1989), Graesser (e.g., 1981; Graesser & Bower, 1990), van den Broek (1990a, 1990b), and others were in part the products of conscious processes, processes that were essential for me to understand, given my career-long interest in how purposeful processing affects learning, memory, and comprehension.

I went with the instincts that had served me well in understanding paired-associate learning. I started inviting people to my office, asking them to think-aloud for me as they read. What I heard was a bit overwhelming. Reader after reader provided extremely rich think-alouds, ones filled with strategies, attempts to make inferences, and great intellectual activity in general, including reflection on and evaluation of what was read. As I reviewed the quantitative, experimental studies of text processing conducted in the 1980s, what was surprising to me was that none of these studies seemed to be capturing the richness of the processing that I heard readers describing. Moreover, as I read the think-aloud studies of reading conducted in the 1970s and 1980s, I had the same feeling, only more intense, for I knew the think-alouds I had witnessed in my office were filled with information about reader strategies, attempts to construct inferences, and reflections on text.

What was going on in the verbal protocol studies of reading? Most of the think-aloud studies were designed to test particular hypotheses—to determine if particular types of processing were occurring. That is, many of the investigators believed some particular type of processing was occurring in reading and conducted their think-aloud analysis to confirm such a possibility or elucidate the processing further. I realized what was needed was think-aloud studies in which the researchers were as open-minded as possible about the processes that might be reported. I was optimistic that such an approach might work in light of my recent success in studying elementary-level comprehension strategies instruction. By approaching that work with the goal of constructing as complete a grounded theory of teaching as possible, my colleagues and I had constructed a theory that included much that others had missed when they had studied elementary-level comprehension strategies instruction. I knew what I had to do: It was to apply such an open-minded, grounded theoretical approach to the analysis of verbal protocols of reading. Before describing the efforts of my colleagues and me to do this, I review briefly some essential prerequisite materials: how grounded theories are constructed and why there is reason to believe that verbal protocols of reading are valid indicators of reading processes.
Development of Grounded Theories Using the Method of Constant Comparison

Before a scientist will use a methodology, she or he must be convinced that it is rigorous and effective in doing what is claimed it does. Strauss and Corbin's (1990), *Basics of Qualitative Research: Grounded Theory Procedures and Techniques* particularly convinced me that construction of grounded theories made sense. I describe here some highlights of their perspectives on data and its analysis.

Construction of a grounded theory begins with collection of data. That is, this is an approach for developing a theory that is grounded in data. As a dyed-in-the-wool empiricist, this aspect of Strauss and Corbin's thinking was exceptionally appealing to me. The researcher who is attempting to develop a grounded theory may spend a great deal of time observing behaviors in a setting of interest, interviewing informants, or, particularly relevant here, have people think aloud as they do a particular task. Many types of data can inform the development of a grounded theory. In some cases the researcher will rely on only one type of data, in other cases on variations of one type of data (e.g., different types of verbal protocols of reading), and in still other cases, several types of data.

The task then is to induce regularities from the data collected, through a method known as constant comparison. Thus, the researcher goes through the data systematically looking for meaningful clusters and patterns—behaviors that seem to go together logically. It is then necessary to name the clusters, to come up with category names for the behaviors included in the clusters. Such an analysis often results in a number of categories.

The next objective is to attempt to identify evidentiary support for the categories. The investigator, however, is always open to—and actually looking for—data inconsistent with the emerging categories. This can be done by reviewing previous data, but typically also includes the collection of new data.

We note that qualitative researchers typically begin their analyses early in the data collection. As tentative categories emerge, there is opportunity with every new data collection to look for support or nonsupport of categories—to compare tentative conclusions with conclusions suggested by new data. The researcher may change categories or their names, delete categories, or add them in light of new data. In short, there is fluid interaction between data collection, data analyses, and construction of conclusions. Analyses and data collection are interwoven enterprises.
Eventually, there is a stable set of categories. The task then is to define the categories precisely, in terms of defining properties, and to begin to organize these categories in relation to one another. For example, categories can be placed in hierarchical arrangements with each category defined in terms of its defining properties. Once the categories have been identified, fully defined, and placed in hierarchical arrangement (with these categorizations, definitions, and arrangements challenged by checking against the data a number of times), the researcher can begin to feel that the data on hand are understood about as well as they are going to be understood. Data collection continues until no new categories, defining features of categories, or relationships between categories are being identified. This may take a while or it may happen fairly quickly. Strauss and Corbin (1990) are emphatic that researchers must continue to analyze the data—must continue to compare emerging conclusions against new data—until the point is reached when no new information is being generated, for to do otherwise results in an incomplete grounded theory.

Just as it is possible to evaluate the quality of quantitative studies, it is also possible to evaluate qualitative studies—on about the same dimensions. The language is different, however (Guba & Lincoln, 1982; Lincoln & Guba, 1985). Dependability is the qualitative analysts’ term for reliability. That is, the qualitative analyst must convince that most people would come to the conclusions that are drawn based on the sample of data analyzed. Rather than worrying about internal validity, qualitative researchers are concerned with credibility. To the extent that the case is strong that the grounded theory captures the reality of the situation studied, the greater the credibility of the study. Rather than external validity, the qualitative analyst values transferability—that the analysis was conducted in a setting representative of the universe to which the researcher wants to generalize. Confirmability is the term used instead of objectivity, with confirmability generally high when something like triangulation occurs in the study—when multiple indicators are used to buttress conclusions. The best qualitative studies are high on all of these characteristics.

Validity of Verbal Protocols of Reading

If verbal protocols of reading are to be used as indicators of skilled reading, it is essential that there be clear relationships between verbal reports of cognitive processes during reading and actual reading. As it turns out, the track record on this count is strong for adults readers, including the following outcomes:
• Hare (1981) reported that good compared to weaker college student readers were more likely to monitor their comprehension as they read and set into motion fix-up strategies when comprehension was less than complete.

• Olson, Mack, and Duffy (1981) observed correlations between self-reported strategies at particular points in text and the speed of processing at those points. That is, reading was slower early in a story when readers reported storing background information presented in the story and formulating hypotheses about the stories read. At points where substantial inferential activities were reported, processing was slower. Subjects reported simply confirming their suspicions as they finished text with relatively rapid reading times near the end of text.

• In Trabasso and Suh (1993), self-reported inferential activities predicted a variety of performance measures related to the inferences, including reading times and long-term retention of stories.

• Wade, Trathen, and Schraw (1990) examined the overall patterns of strategy use reported by college students as they read The Sea Around Us. They detected six types of profiles of text processing, varying from ones that reflected extensive responding to text to minimal responding. By far, one of Wade et al.'s groups was more sophisticated in their strategies use than any of the other five. This group, which Wade et al. (1990) referred to as "good strategy users," following a categorization suggested by Pressley, Borkowski, and Schneider (1987), was more diverse in their strategic responses to text than were other participants in the study. They made notes, paraphrased, outlined, and/or constructed diagrams as they read. They varied their reading speed from skimming to slowing, and they reread when it was necessary. They made use of their notes and mental notings to review the text read after reading. With respect to recall of important information in the text, there was more than a half standard deviation recall difference favoring the good strategy users relative to the next best group.

• Guthrie, Britten, and Barker (1991) reported that the strategies self-reported by college students as they searched documents for information correlated with how efficiently they searched text.

• Haas and Flower (1988) observed that graduate students were more likely than undergraduate students to do "rhetori-
cal reading” of a section of an undergraduate textbook. That is, they reported attempting to understand the author’s intentions in writing the text as it was written.

- Deegan (1993) observed that first-year law students who were doing well in law school read differently than first-year law students experiencing difficulties in school. Specifically, the better students were more likely to respond to text with questions about the meaning and structure of a law-related text they read.

- Lundeberg (1987) reported that legal experts were more likely than legal novices to attend to important information in a legal case they read, and to overview the case, attempt to summarize it, evaluate it, and reread the case analytically.

- When Earthman (1989) had graduate students in English and freshmen read short stories and poems, she found that the graduate students were more likely than freshmen to work at filling in gaps in meaning in the texts and were more likely to relate texts to knowledge of the world. The graduate students were also more likely to take alternative perspectives while reading the literary works.

- Graves and Frederiksen (1991) observed considerable differences between the think-alouds of English professors reading an excerpt from *The Color Purple* and college sophomores doing so: The professors were more aware of the functions of the narrative in the text as well as the relationship of the author to the reader of the text. The experts viewed the text as the result of deliberate choices made by the author, with their perceptions of these choices affecting their understanding of the text.

- In Wineberg (1991), when historians read American history textbook material, they were much more likely than high school students to search for the authorial intentions and hidden meanings. High schools students treated the texts more as factual documents containing information that was not open to question. The historians questioned.

In short, a variety of investigators, collecting diverse think-aloud data as people read, have observed correlations between reported reading behaviors and reading performance or between reported reading behaviors and level of reading ability. Although my view at the outset of this study was that much more validating data would be desirable, I was struck that the studies validating verbal protocols were not countered in the literature by failures to obtain verbal
report-reading relationships. There is good reason to have confidence in the validity of verbal protocols of reading.

Summary

Since the earliest days of my career I have been aware of the verbal protocol approach. It worked well for me in the past, as it has for other investigators interested in complex cognition. I have also been interested in comprehension processes throughout my career. Although I enjoyed some research success in analyzing comprehension, I felt that much important about comprehension was not coming through either in existing experimental analyses or verbal protocol studies, an awareness developed as I listened to verbal protocols of text processing much richer than the descriptions of processing in the existing literature. My success with the grounded theory approach as a tool for the analyses of comprehension instruction impressed upon me the power of this approach to elucidate complex phenomena. Thus, it made sense to me to apply that approach to analyses of verbal protocols of reading, believing that if I did so, I would produce much richer descriptions of reading than had been generated in the past. What follows is a description of how my colleagues and I did so in a single study, followed by a brief review of how Afflerbach and I applied the method of constant comparison to 40 verbal protocols of reading to produce a general grounded theory of conscious processes during reading.

HOW SOCIAL SCIENCES PROFESSORS READ JOURNAL ARTICLES

What Wyatt, Pressley, El-Dinary, Stein, Evans, and Brown (1993) wanted to do was document reading at its best—what it might look like when exceptionally skilled readers are reading content that is interesting to them for a purpose that is important to them. As members of a Washington DC university community, a convenience sample of skilled readers was faculty members. Given what we knew about expertise (Chi, Glaser, & Farr, 1988), it seemed likely that the most sophisticated reading might be observed when readers read in domains in which they had high prior knowledge. Thus, we decided that we would ask professors to read in their areas of expertise. So that their interest would be high, and the material was being read for an authentic, meaningful purpose for the professor, we felt that it would make most sense to allow the readers themselves to select the articles they would read.
In identifying a pool of potential "expert" participants, the following criteria were applied: (a) The participant possessed a doctorate in a social or behavioral science. (As social scientists ourselves, my students and I felt that we would be in a better position to understand the think-aloud comments of social scientists compared to natural scientists, humanities scholars, or professors in some other field foreign to us.) (b) The participant had published at least five articles in selective outlets over the last 5 years. We felt that this criterion would assure a fairly select sampling within the select category of university professors. None of the participants, however, had written on reading strategies, nor was there any reason to believe that any had particular scholarly expertise about the nature of skilled reading.

Procedures

At an initial meeting, the participating reader was told that the purpose of the study was "to investigate how experts stay current in their fields of expertise." Participants were asked to select three research articles that they had not yet read but would be interested in reading as part of "staying current in their field." The researcher requested that the participant not begin reading the articles—that they make their selections on the basis of author and title only.

The entire second session was recorded on audio tape. At the start, the investigator explained that the session would be devoted to working with one of the articles. The subject then chose an article from the three she or he had identified. In all cases but one, the article was the report of original empirical research; in the outlying case, the article was a position piece on a particular research direction.

Participants were directed to "read the article as they normally would." They were encouraged to think aloud as they went through the article, offering any comments or explanations they wished. Using a duplicate copy of the article, the investigator noted the participant's actions, attentive to any aspect of the participant's behavior that pertained to processing of the article. For example, the researcher noted indications of the reading path taken through the article—when different sections were begun, pages turned, text underlined, verbatim statements made, and so on. Observations of participant's nonverbal behaviors also were noted on the researcher's copy. If more than 2 minutes passed without any verbal comment from the reader, the investigator prompted the reader with the question "What are you doing now?" At the end of the session, the researcher collected the participant's copy of the article so that any markings the participant made could be analyzed further.
Records of this second meeting were expanded into a comprehensive chronological description of the participant’s activities while reading the article. In this process, the researcher’s notes, audio recording, and any annotations on the participant’s copy of the article were combined to generate a thick description of the participant’s reading behavior.

In the third and final participant-investigator meeting, the investigator gave the participant a copy of a process description of their reading. This provided an opportunity for participants to identify problems in the description and analysis of their reading strategies. When the participant disagreed with the description or analysis (which was extremely rare and never with respect to a major conclusion in the protocol), the disagreement was noted and an adjustment in the protocol considered later by the researcher, following additional review of the raw data.

Analyses

For the first five readers in the study, five members of the research team each worked with a participant’s protocol and began an analysis of the observed reading behaviors, following a variation of the method of constant comparison (Strauss & Corbin, 1990) described earlier. In particular, they examined and reexamined a protocol, attempting to identify categories that exhaustively accounted for the behaviors in it. Then, these five researchers and a sixth member of the research team met and compared categories they had observed. Each researcher then reexamined the protocol they had analyzed in light of categories identified by the other researchers. Over the course of several meetings, analysis and discussion of strategies used by these first five participants resulted in a long list of individual strategic behaviors. Additional meetings then occurred, each one followed by reanalysis of the reading protocols of the first five participants and reflection on the categories of reading behaviors that typified what was observed in the reading of the first five participants. After about 8 weeks of reanalyses and reflection, the six co-investigators were satisfied that the most critical reading behaviors were captured adequately by the categories summarized in Table 1. The scoring categories were grouped into theory-based sets and subsets as reflected in the organization of Table 1.

The 10 protocols of reading subsequently collected also were scored in terms of the Table 1 criteria. Two researchers scored each protocol: the researcher who had had face-to-face contact with the participant and one other member of the research team. The team
Table 1

Linearity and Nonlinearity of Reading
- Reader either surveys text before reading it or does not.
- Reader either generally reads article from front to back or does not.
- Reader either reads large section of article in a linear fashion or does not.
- Frequency of jumping forward (jumps ahead to another section, staying at least 30 seconds) or looking forward in text for particular pieces of information (e.g., footnotes, results, references) and returns.
- Frequency of jumping back (Jumps back to another section, staying at least 30 seconds) or looks back in text for particular pieces of information and returns.
- Frequency of reading selectively in linear fashion (skips some information, then reads closely) during reading of the abstract, introduction, methods, results, discussion/conclusion, references.

Goal Awareness
- Whether highly aware (before reading) of specific information being sought from the article and looking for it.
- Whether looking for information relevant to personal and/or professional goals (own research, writing, teaching, bibliography).

Awareness
- Frequency of reading aloud (and self-reports that he or she would read aloud if reading alone).
- Frequency of exploiting personal strengths (e.g., says can understand tables better than text, so more attention to tables, or vice versa).
- Frequency of closely attending to tables/figures.
- Frequency of talking about things, “I typically do when I read.”
- Frequency of varying reading style according to relevance of text to reading goals. (Style includes slowing for careful reading, skimming, and very fast skimming.)
- Frequency of expressing own biases/expectations toward text.

Continued....
Planful

- Frequency of reported watching for particular information throughout reading.
- Frequency of reported decisions to continue reading (based on the abstract or something other than abstract).
- Frequency of claiming intent to read section in specific order.
- Frequency of adjusting attention to material depending on relevance to reading goals.
- Frequency of noting parts of text (e.g., references) to read later or to remember for future reference.

Monitoring

- Frequency of backtracking. (Rereads a sentence for clarification or backtracks for stated purpose of clarification.)
- Frequency of noting explicitly how difficult the text is to read (reading is easy, difficult, she/he does not understand the text, something in text is puzzling).
- Frequency of noting explicitly when something in text is worth or not worth noting.
- Frequency of noting explicitly when something in text is already known or not known to him/her.
- Frequency of noting explicitly when something is taken from another source (e.g., from a named researcher’s work).

Relating Information to Prior Knowledge Base

- Frequency of reading reference list to activate prior knowledge.
- Frequency of anticipating/predicting information that will be presented; testing predictions.
- Frequency of reacting to information based on own knowledge (including reactions to the author being read, others authors cited in the text, methods, analyses, content, discussion, or text structure of the paper).
- Frequency of reacting to text based on very personal prior knowledge (e.g., own theories, own writing, knows author personally).
- Frequency of noting that text contradicts a belief held by the reader.

Continued.....
Table 1 (continued)

Evaluative Reactions

- Frequency of evaluating relevance to goals.
- Frequency of evaluating whether what is being read is the specific information being sought from the article.
- Frequency of evaluating whether information is relevant to personal and/or professional goals (own research, writing, teaching, bibliography).
- Frequency of evaluating the text (including reactions to literature review, particular citations, theoretical perspectives, methods, analyses, and results—including the novelty of findings, conclusions, discussions, implications, writing/editing style, and biases of the author).

Going Beyond the Information Given (Elaborations)

- Frequency of constructing conclusions or summary interpretations beyond information provided in article. (Comes up with summary interpretation of results, tables, or discussion/conclusion.)
- Frequency of constructing paraphrases/explanations of what is in the text and/or gives examples.

Integration

- Frequency of going back and forth in text (to go to table or figures or to guide further reading in this article). Goes back and forth between figures/tables and text or compares figures/tables with one another to integrate.
- Frequency of getting information explicitly from text on figure or information from figure on side of text or side of figure.
- Frequency of verbally relating material from different parts of text.
- Frequency of summarizing the whole paper after reading it.
- Frequency of indicating she or he will be looking at other materials later with eye to relating to what is in this text.

Elucidation of Discourse Structure

- Frequency of mentioning division or relations among different parts of a section or marks major divisions of an argument (e.g., by writing brief title for division, numbering steps).

Continued.....
Table 1 (continued)

Written Responses

- Frequency of highlighting (frequent marking of text to highlight, including underlinings, check marks, arrows, brackets, boxes) and marking references/terms to find later.
- Frequency of elaborating (making brief summaries of text, including marginal notes); sketching the design of the study in writing; relabeling figures/tables; adding more information to figures/tables; rewriting some information in clearer, more memorable form.
- Frequency of writing notes on separate piece of paper or computer.

Affective Reactions

- Frequency of expressing positive affective reactions.
- Frequency of expressing negative affective reactions (including anger, tiredness, or boredom).
- Frequency of expressing interest.
- Frequency of expressing lack of interest.
- Frequency of expressing surprise.
- Frequency of using expletives or slang.

Nonverbal Responses

- Frequency of laughing, looking puzzled, gesturing, giving raspberry, scratching chin, putting hands on forehead.

continued to meet frequently to assess whether the existing set of reading strategies needed to be modified. There were very few behaviors (and no potentially important ones in our view) produced by the 15 participants that were not consistent with the Table 1 categories. When participants’ behaviors were categorized as never occurring, occurring once, occurring 2 to 4 times during the session, or occurring 5 or more times, there was little disagreement at all between raters (i.e., although the two raters might disagree whether 7 or 8 instances of a behavior occurred, this made no difference when the response classification was that the behavior occurred “5 or more times”).

Results

All 15 readers in the study were very active, using well-regarded comprehension strategies, such as predicting and verifying predic-
tions, summarizing, elaborating on text, seeking clarification, and reading selectively. The readers in this study monitored comprehension and important characteristics of the text, such as its difficulty level and relevance to reading goals. They evaluated the adequacy of text form and content. Indeed, each of the behaviors in Table 1 was evidenced by the majority of readers in this study. Moreover, there was nothing rigid about their articulation of strategies and prior knowledge, but rather, the readers were highly responsive to text, shaping their reactions on the basis of text content, its relationship to their prior knowledge, and their purposes in reading the text.

Summary

What Wyatt et al. (1993) reported was the most elaborate set of comprehension processes ever identified in a verbal protocol study. This was undoubtedly due partly to the sophistication of their readers and to the match between readers' prior knowledge, interests, and what they were reading. I believe, however, that the detailed model of text processing emerging from Wyatt et al. (1993) also was due to the analytical approach taken. We reflected long and hard on what the readers were doing, reflecting and rereflecting on the possibilities of missed categories of responses. In the end, what we had was a high quality qualitative study. The results were dependable, in the sense that we believe most observers armed with the Table 1 criteria would have scored the individual readers as we did, given that the members of the research team were able to score the protocols with great reliability. With respect to credibility, there was simply nothing left over to score after the Table 1 criteria were applied: An internally valid model accounts for everything in the data, and this analysis did so. There was transferability. The scoring scheme developed with the first 5 readers generalized to the next 10 readers.

Even so, this study did not capture all the conscious processes that are skilled reading. No individual verbal protocol study could do so, for each is limited with respect to type of reader and the type of material being read. To capture all of the conscious processes that are skilled reading, what is required are diverse readers reading a variety of materials. More positively, when all of the verbal protocol studies of reading are considered, there is an enormous range of readers reading a great variety of materials. I realized that it might be possible to construct a general model of conscious processing by collapsing the outcomes obtained across these studies. I also recognized that the method of constant comparison could be adapted to do that, with the promise of a general grounded theory of conscious reading.
A GENERAL THEORY OF CONSCIOUS READING: USING CONSTANT COMPARISON TO GENERATE A META-ANALYSIS OF THE VERBAL PROTOCOLS OF READING

Wyatt et al. (1993) was simply one in a long line of verbal protocol studies of reading, beginning with Squire's (1964) analysis of how teenagers process short stories. Across these studies, many different readers have been studied from grade-4 students to middle-school and high-school students to college students and their professors as well as other highly skilled professionals. Many different types of materials have been read from poems and paragraphs to short stories and expository pieces. Readers’ goals have varied from study to study. The specific instructions provided to readers varied as well. Thinking aloud was operationalized in a number of ways in these studies, from completely self-regulated thinking aloud during reading to reporting thoughts at designated points in text to reporting thoughts shortly after reading is completed. Sometimes the scoring of data was grounded completely in the data, as in Wyatt et al. (1993). More often, it was not, with investigators interested in particular processes and hence, scoring the protocols selectively. One reaction to all of this variability might be to throw up one’s hands and exclaim that general conclusions about reading could not possibly emerge from it. If the goal is to understand every conscious process that might occur during reading, however, the variability across studies is something of a godsend. The more variability in research operations, presumably the more variability in processes reported. To the extent that the operations in the various studies have sampled well the entire range of operations possible in such studies, the more likely the processes observed will be representative of the entire range of conscious processes during reading.

Thus, Peter Afflerbach and I located every verbal protocol study of reading that we could (Pressley & Afflerbach, 1995). Our intent was to categorize and organize every conscious reading process reported by the readers in these studies. That there were 40 studies made this task formidable. These studies were produced in diverse disciplines, from cognitive psychology to rhetoric to reading education and thus, ranged from extremely quantitative efforts to entirely qualitative investigations. That there were very different reporting standards and practices across studies greatly increased the challenge in summarizing data across investigations.

Even so, Pressley proceeded to do so, using a constant comparison approach, checked and challenged by Afflerbach. Pressley and
Afflerbach (1995) read every study completely, initially listing every process reported in the studies. These lists were then reduced by collapsing over redundant reports, categorized, and then organized. The categorizing and organizing continued until neither Pressley nor Afflerbach could discern any new categories or relationships between categories.

The final result required 27 single-spaced pages typed in a small font (see Chapter 3, Pressley & Afflerbach, 1995). Since producing that catalog of conscious reading processes, another half dozen verbal protocol studies have come to my attention. None of those included data that would have altered the 27-page summary. Thus, our confidence is increasing that we exhaustively categorized conscious reading processes. Table 2 is a much reduced version of the full Pressley and Afflerbach (1995) catalog.

**Table 2**

I. Identifying and Learning Text Content

A. Before Reading

1. Constructing a goal for reading of this text
2. Overviewing (skimming) the text
3. Deciding to read only particular sections and which particular sections
4. Deciding to quit the reading because content irrelevant to reading goals
5. Activating prior knowledge and related knowledge
6. Summarizing what was gained from previewing
7. Based on overviewing, generating an hypothesis about text meaning

B. During Initial Front-to-Back Reading

1. Generally front-to-back (i.e., linear) reading of text
2. Reading only some sections, ones believed to contain critical information
3. Skimming (i.e., less complete than front-to-back skimming cited earlier)
4. If text is easy, reading using automatic processes, until something goes wrong
5. Reading aloud; voicing what is otherwise subvocal speech
6. Repeating/restating text just read to hold in working memory
7. Repeating/restating a thought that occurred during reading

continued....
Table 2 (continued)

8. Making notes
9. Pausing to reflect on text (and perhaps notes, if made)
10. Paraphrasing part of text
11. Explicitly looking for related words, concepts, or ideas in text and using them to construct a main idea, gist, or summary
12. Looking for patterns in the text
13. Predicting-substantiating (i.e., draft-and-revision strategy for main ideas of text as well as how the author has structured the text)
14. Resetting reading/learning goals at a different level of understanding because the text suggested that there might be a more appropriate goal

C. Processes in Identifying Important Information in Text

1. Looking for information relevant to personal or professional goals or specific reading goals for this text (i.e., reading selectively)
2. Deciding which pieces of information in text are important (in relation to the goal involved in reading this text), based on prior knowledge
3. Looking specifically for what is "news" in the reading
4. Dismissing information presented in text because it is not consistent with prior knowledge (i.e., accepted thinking in domain covered by the reading)
5. Looking for/acquiring key words (i.e., concepts repeated in text; important vocabulary, phrases; qualifying words, such as if, when, only)
6. Looking for topic sentences
7. Looking for topic paragraphs
8. Noting parts of text to remember for future reference
9. Noting references in the text that should be looked at or considered later
10. Somehow marking important points in text, including important examples
11. Skipping examples because general points not provided in examples
12. Copying key sentences
13. Adjusting importance ratings as additional text is encountered continued....
Table 2 (continued)

D. Conscious Inference-Making
1. Inferring the referent of a pronoun
2. Filling in deleted information
3. Inferring the meanings of words based on clues
4. Inferring the connotations of words and sentences in the text
5. Relating information encountered in text to prior knowledge
6. Making inferences about the author
7. Making inferences about the state of actors, world in a text
8. Confirming/disconfirming an inference with information in subsequent text
9. Stating/drawing of/deducing implied conclusion

E. Integrating Different Parts of Text
1. Explicitly attempting to get the "big picture" before worrying about details
2. Generating the big idea as well as the development of ideas about component parts, with these related to one another during the reading of the text
3. Noting different parts of text and their interrelationships
4. Holding representations of the ideas developed in text in working memory
5. Combining text structure and contextual clues to determine text meaning
6. Searching text for information related to point currently encountered
7. Searching text after a first reading, hoping to find/stimulate a macrostructure, because a satisfactory one was not detected during first reading
8. Rereading text to search for intersentential connections
9. Relating the currently read text to a previous portion of text
10. Making notes to assist/stimulate integration

F. Interpreting
1. Paraphrasing parts of text into more familiar terms
2. Visualizing concepts, relations, emotions specified in/inferred from text
3. Identifying "symbols" or "symbolic language" and translating them

continued....
### Table 2 (continued)

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<tr>
<td>4.</td>
<td>Instantiating prior knowledge schemata that are activated by information in the text (e.g., thinking about a particular restaurant while reading an article about the social hierarchies in restaurants)</td>
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<tr>
<td>5.</td>
<td>Empathizing with messages in text</td>
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<tr>
<td>6.</td>
<td>Making claim about “what the author really wanted to say”</td>
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<tr>
<td>7.</td>
<td>Constructing interpretive conclusions</td>
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<tr>
<td>8.</td>
<td>Constructing interpretive categorizations (e.g., of the entire text type; of general concepts developed in text)</td>
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<tr>
<td>9.</td>
<td>Physically or mentally doing (enacting) what the text instructs the reader to do (or suggests people should do) and then confirming the expected outcome or noting the discrepancy from the expected</td>
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<tr>
<td>10.</td>
<td>Constructing (and/or holding in memory) alternative interpretations of text</td>
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<tr>
<td>11.</td>
<td>Constructing (and/or holding in memory) alternative perspectives on a story from the perspectives of different characters in the tale</td>
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<tr>
<td>12.</td>
<td>Pretending to deliberate with others while reading the text, perhaps by talking to themselves, with alternative interpretations entering the dialogue</td>
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### G. After Reading

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<table>
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<tbody>
<tr>
<td>1.</td>
<td>Rereading after the first reading</td>
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<td>2.</td>
<td>Reciting of text to increase memory of it</td>
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<tr>
<td>3.</td>
<td>Listing pieces of information in text</td>
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<td>4.</td>
<td>Constructing cohesive summary of the text</td>
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<td>5.</td>
<td>Self-questioning, self-testing over text content</td>
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<td>6.</td>
<td>Imagining how hypothetical situations might be viewed</td>
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<td>7.</td>
<td>Reflecting on information in article, with it possible for consequent shifts in interpretation unfolding over an extended period of time</td>
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<td>8.</td>
<td>Rereading parts of text following reflection</td>
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<td>9.</td>
<td>Continually evaluating and possibly reconstructing understanding</td>
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<td>10.</td>
<td>Changing one’s response to a text as the understanding is reconstructed</td>
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<tr>
<td>11.</td>
<td>Reflecting on/mentally recoding text in anticipation of using it later</td>
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continued....
II. Monitoring

A. Text Characteristics: Perception of...
   1. Whether text content is relevant to the reading goal
   2. Difficulty of the text
   3. Author’s style/style of text; structure of the text
   4. Linguistic characteristics of text (e.g., lexical-morphological, syntactic)
   5. Specific biases reflected in text content, specific expectations of the text author about the readership
   6. Relation of this part of text to larger themes in the text
   7. Relation of this text to other sources
   8. When text is ambiguous or potentially so
   9. Relationship between own background knowledge and text content
   10. Tone of the text

B. Meaningful Processing of Text: Perception of...
   1. One’s purpose in reading the text
   2. Own behaviors/strategies in processing text
   3. Reading behaviors/strategies as in the service of the reading goal
   4. One’s typical reactions to this type of text
   5. The difference in reaction to this text compared to typical reactions to text
   6. Effectiveness of processes and strategies used to make meaning
   7. When comprehension processes are challenging capacity limit
   8. When there has been progress in meaning-making, although more to go
   9. Whether overall meaning is comprehended or reading goal is accomplished
   10. Text gets easier to read as meaning becomes more certain
   11. When the end of a unit of meaning has occurred
   12. When the reading goal has been achieved

C. Problems: Recognizing...
   1. Loss of concentration
   2. Reading too quickly (e.g., decoding is occurring, but comprehension is low)

continued....
Table 2 (continued)

3. Text is poorly written
4. Unfamiliar terms in text
5. Failure to understand what has been read or achieve one's reading goal
6. Lack of background knowledge is affecting comprehension negatively
7. Inconsistency between personal beliefs and information in text; inconsistency between text meaning and opinions of authoritative sources
8. Inconsistency of one's expectations about meaning and information in text; conflict between interpretation made previously and new information in text

D. Monitoring and the Stimulation of Cognitive Processing: Activation of Processes to Accommodate Text Characteristics/Task Demands

1. Subjects make decision about how much to interpret text strictly or liberally, depending on their goal in reading or task demand that is on them
2. Decision to rank order reading tasks or goals based on judgment that not all are attainable or doable given contextual constraints
3. Decision to skip material
4. Decision to skim material
5. Decision to read material carefully
6. Decision to construct the meaning of text carefully because aware that the text is difficult (e.g., abstract, torturous syntax)
7. Decision to reset reading goal at a lower level because it is apparent that the reader will not be able to fulfill original reading goal by reading this text
8. Decision to look up background material in other sources because aware that other knowledge is required to make sense of what is in a current text
9. Decision to dispense with processing of some part of text because of awareness of potential capacity overload
10. Decision to focus on some content and not other material because of beliefs about processing strengths and weaknesses

continued....
Table 2 (continued)

11. Decision to reread material in one section because it is not yet understood
12. Decision to reread material in one section because it is interesting
13. Decision to just keep reading in hope that later content will become clearer
14. Attempt to pinpoint confusions

E. Activation of Processing Due to Awareness of Difficulties at Word or Phrase Level

1. Evaluating importance of unknown word or phrase to overall meaning of text before deciding whether to expend effort to determine its meaning
2. Greater attention paid to unknown word or phrase
3. Use of context clues to interpret a word or phrase
4. A candidate meaning for unknown word/phrase is generated, with subsequent evaluation of the reasonableness of the sentence using that meaning
5. Generating hypotheses about confusing word, concept, or phrase followed by attempts to determine the adequacy of the hypothesis
6. Just keep reading, forgetting about the word
7. Use a dictionary

F. Activation of Processing Due to Awareness of Difficulties in Understanding Meaning Beyond the Word or Phrase Level

1. Although aware of the comprehension difficulty, doing nothing
2. Once aware of a comprehension difficulty, taking a corrective approach (e.g., analyzing carefully information read thus far; rereading last section read)
3. Once several potential interpretations of text are recognized, ones not obviously consistent with one another, reader responds (e.g., constructing inferences to account for the perceived discrepancies)
4. If a part of text cannot be understood completely, shifting focus to other parts of the text or questions not considered but also need to be resolved
5. If a text cannot be understood, attempting to think of an analogy

continued....
Table 2 (continued)

6. If a reading-related goal is determined unattainable, adjusting the goal
7. Looking up some of the references cited in the write-up or seeking other information from other sources
8. Reading on without figuring out interpretation when one cannot be discerned
9. Distorting some information to interpret consistent with tentative hypothesis
10. Distraction (thinking about things other than reading; falling asleep)
11. Simply giving up on understanding the text and quitting

G. Post-Reading Monitoring and Decisions to Process Additionally
1. If reader is aware that the macrostructure active at the end of reading is consistent with text, and important questions that came up during the reading have been answered, not likely to search text additionally
2. If reader senses inconsistency between macrostructure active at end of a reading and text, or important questions that came up during reading have not been answered, reader continues search for meaning

III. Evaluating
A. Consistent Evaluative Mindsets
1. Anticipatory evaluation/affect, based on feelings about/knowledge of topic
2. Acceptance
3. Skepticism, with wariness heightened to the extent that the material is likely to impact conclusions considered important by the reader
4. Reader acutely aware document was written by a particular person with particular biases, purposes, background knowledge and hence, believes document must be evaluated by implied meanings

B. Focussed Evaluations
1. Style of the text
2. Content of the text
The Nature of Conscious Reading Emerging from the Verbal Protocol Data

What is most striking from reading the verbal protocol studies is that readers are so driven to construct meaning. Every action in Tables 1 and 2 are directed at meaning making or is the result of meaning making. Readers can interact flexibly with text, using their prior knowledge to construct interpretations of what they are reading, relating what they already know to the new ideas in text. Readers often respond passionately to ideas conveyed through text. As Pressley and Afflerbach (1995) noted: They are constructively responsive in their reading, especially when they are working with texts that are important to them, interesting to them, and related to matters in which they have decidedly well-informed opinions and clear expertise.

There are four clear indications of constructive responsivity in the verbal protocols:

1. Readers can actively search, reflect on, and respond to text in pursuit of main ideas and important details. The skilled reader comes to a text knowing that it has main ideas and supporting information. An overview of the text can provide a great deal of information about the general type of information covered in it and where various topics in the reading are located. There is definitely differential attention to information in text that seems centrally relevant to the reader’s goals. The reader sometimes jumps back and forth to consider important points in the text carefully, points that seem critical to comprehend in order to get what seems like critical information from text. There is focus on important details as part of constructing the whole meaning of text.

Inferential activities also reflect the pursuit of larger themes, from inferences about the author’s overall intent in writing the piece to the drawing of conclusions strongly implied by the text. Readers’ awareness that the parts of text add up to a much greater whole is reflected by their many attempts to integrate across disparate parts of readings. Those attempts also reflect determination to get at the larger meaning of text, for protocol study participants reported great efforts expended in comparing parts of text, holding disparate ideas in working memory while searching for related ideas throughout text, and rereading to clarify how previously encountered information related to parts of text just covered.

After a text has been read, additional reflection and rereading are common, again in the service of finding the larger meanings in the text. Readers monitor whether they have comprehended a reading. If
they feel they have not comprehended the text's overall meaning, this can be motivation to process the text additionally and/or differently in order to construct a more complete understanding of it. Evaluations of the whole text are common in reader remarks, including evaluations of the validity, interestingness, structural integrity, and sophistication of the overall text. In short, there is construction and response throughout the process of reading for understanding, with pursuit of an understanding of the whole stimulating much processing and analysis of the parts of text.

2. Readers respond to text with predictions and hypotheses that reflect their prior knowledge. This can start with an overview of text, with hypotheses advanced about the potential meaning of the text. Hypothesis generation continues as front-to-back reading begins. At some point, information will be encountered making clear that at least some of the hypothesized points are in error. Is there anything dysfunctional about prediction errors? No, they reflect active engagement, attempts to understand text by relating it to prior knowledge. That such errors were common in the think-alouds makes clear the constructive nature of the reading captured in the protocol analyses. That the initial hypotheses of the readers did not prevail but yielded to information in the text makes clear the responsive nature of consciously controlled reading.

3. Readers often are passionate in their responses to text. It particularly comes through when readers have great expertise related to and interest in the topic of the text. There was surprise, laughter, puzzlement, frustration, and anxiety in the think-aloud reports. These responses were possible because of extensive prior knowledge and the related values and beliefs of the readers in these studies. The passions are responsive in that they were elicited by particular points made in text.

4. Readers’ prior knowledge predicts their comprehension processing and responses to text. Thus, the initial hypotheses about the meaning of text that result from overviewing are a product of associative responses to information encountered during the preview. As reading proceeds, additional associative responding based on prior knowledge is common. Also, prior knowledge affects decisions about what is potentially important (e.g., novel) in a text and worthy of differential attention and what is not so worthy. Such inferences are largely based on prior knowledge. For example, conjectures about Michener’s purpose in writing his current book are informed by knowledge of Michener’s purposes in writing previous books. Interpretive categorizations of a work (e.g., a “political satire” or an
“historical fiction”) require knowledge of such genres. In fact, interpretations of all sorts require prior knowledge that permits the reader to imagine the state of affairs depicted in the text as well as how the state depicted in the text contrasts with other states of affairs. Thus, it is impossible to come to an interpretation of the importance of the Kennedy presidency without knowledge of other presidencies.

Comprehension monitoring is largely enabled by prior knowledge. Much of deciding whether text is comprehended is based on whether the message abstracted from the text makes sense relative to what the reader already knows about the topic of the text. Monitoring also involves awareness of how the new information relates to old knowledge and whether one’s personal prior knowledge permits full appreciation of the text.

Evaluative responses to a text are not possible without massive prior knowledge. Judgments about the qualities of a text depend on knowing a great deal about how texts can be (and typically are) written and about previously existing ideas relevant to the text. Readers embrace pieces that are consistent with what they believe already and often reject writing that is filled with information inconsistent with their own views of the world.

Concluding Comments

Pressley and Afflerbach (1995) offered the most comprehensive analyses of the conscious processes of reading ever compiled. In doing so, they subsumed a number of other theories about comprehension, making clear that support for each could be found in the verbal protocol data but that none of them were sufficient to explain the complicated articulation of processes documented in the think-aloud studies: These included reader response theory, metacognitive theory, schema theory, propositionally based theories of discourse and inferential comprehension, and sociocultural models of comprehension (see Pressley & Afflerbach, 1995, chapter 4).

How good is the theory of constructively responsive reading proposed by Pressley and Afflerbach? It is very credible. That verbal protocols generated since the Pressley and Afflerbach (1995) model was completed seem to be consistent with reading as depicted in Table 2 increases confidence in the model. Because the data informing the model came from studies that varied so much in their particulars suggests that the model summarized in Table 2 is transferable. All of the main categories in Pressley and Afflerbach (1995)—such as the main categories summarized in Table 2—were supported by indica-
tions from multiple studies, indications that varied because of the operational variability across studies and thus, we believe the model has confirmability. That is, its various claims have been triangulated. This is a powerful model, with its power largely because it is a theory that was completely derived from data, with the grounded theorists (Pressley and Afflerbach) reflecting on, categorizing and recategorizing, and organizing and reorganizing until there was a framework that convincingly included all the data. It is a theory worthy of additional testing—which is the product grounded theory analyses are intended to produce.

IMPLICATIONS

What is different because of the analyses reported here? Quite a bit, with this work having implications for the conduct and analyses of future verbal protocol studies of reading, development of standardized measures of reading comprehension, and meta-analytic studies of complex cognitions and behaviors.

Verbal Protocol Studies of Reading

One of the most disappointing aspects of the many verbal protocol studies of reading is that the research was not very analytical. Typically, there was only one condition in a study, that is, no experimental manipulations that would permit assessment of the determinants of comprehension processing. There are very good theoretical and pragmatic reasons to believe that reading will vary as a function of reader characteristics, for example, readers' purpose, prior knowledge, state (e.g., alert vs. tired), and motivation. Comprehension processing probably also varies as a function of external demands, such as the amount of time available for reading.

Other environmental variables may make a difference, too, such as whether text is presented linearly, as it is on a computer screen, or in a traditional book. In short, there is much to be understood about how reading varies as a function of a variety of variables.

One reason researchers have not conducted more analytical studies in the past has been that scoring verbal protocol data has been a major hassle. Particularly relevant here, every new investigation involved a great deal of effort to design an effective scoring scheme. I believe that the existence of the Pressley and Afflerbach (1995) catalog of conscious reading processes will make it much easier to conduct verbal protocol studies because it makes so clear just what processes are possible.
Although I am not optimistic that it will prove easy to design reliable scoring schemes based on the most fine-grained categorizations in Pressley and Afflerbach, I do think that reliable classifications will be possible at more coarse levels of analysis—for example, perhaps about as coarse as the categorizations offered in Table 2. Why do I think that? Examine the level of analysis in Wyatt et al. (1993) summarized in Table 1. The categorizations in that study were very reliable. The difference made by Pressley and Afflerbach (1995) is that the painstaking efforts in Wyatt et al. (1993) to develop a scoring scheme should be less painstaking in the future, so that research resources can be redirected, for example, to expand the number of conditions in these studies.

If I were doing a verbal protocol study today, and I expect I may be back doing them in the near future, I would take the Pressley and Afflerbach (1995) catalog and begin to score my protocols. Then, I would collapse over subcategories until my scoring scheme was reliable. This process should be much easier than starting from scratch and building a scoring scheme. Frankly, I cannot wait to have an opportunity to do this.

Standardized Measures of Comprehension

Standardized measures of comprehension typically require readers to read text and then answer comprehension questions. The quality of comprehension processing is then inferred from performance on the comprehension questions. In contrast, the measurement community increasingly embraces more authentic approaches to assessment, including performance assessments aimed at elucidating more directly cognitive processes. A major challenge to the development of such assessments is the scoring of them.

Just as the Pressley and Afflerbach (1995) catalog should serve researchers collecting verbal protocols, it should also make it easier to score verbal protocols that are collected as part of efforts to develop more authentic comprehension assessments. To be certain, there are enormous challenges that remain for such assessments to become a reality, but I am confident that the effort will lead to important insights about reading. For example, when Cordon and Day (1995) asked college students to think aloud as they read passages from standardized comprehension measures, processing proved to be much less sophisticated than the type of reading Wyatt et al. (1993) observed: The college students relied heavily on rereading rather than more active, selective processing.
One of the main reasons I believe that the Pressley and Afflerbach (1995) catalog will have an impact on standardized testing is that it is the test construction community who have talked most with Peter and me about *Verbal Protocols of Reading*. I am heartened by this development, and by the invitation of the Buros Institute to present here, because I am convinced that cognitive psychology has much more to offer the assessment community than it has offered in the past. In particular, my reading of the interest in *Verbal Protocols* by measurement professionals is that the Pressley and Afflerbach (1995) analysis makes obvious the possibility of reasonably easy and reliable scoring of verbal protocols of reading: One obvious possibility would be simply to collapse across the many categories of response summarized in the book until scoring was reliable.

Consider the following examples based on the level of detail in Table 2. Even if scorers had difficulty determining whether an inference involved inferring the meaning of a word based on context clues versus inferring the connotation of a word, they very likely would have no trouble agreeing that the inference was a conscious inference. Even if scorers could not agree that a particular response reflected the reader making a claim about "what the author really wanted to say" versus the reader empathizing with messages in a text, the scorers would likely agree that the reader was interpreting the text.

In summary, the verbal protocol approach offers a much more direct window on processing than other forms of comprehension measurement. At a minimum, because cognitive psychologists have collected verbal protocols of excellent reading, composing, and problem solving, those devising tests to evaluate the sophistication of cognition at least have a better understanding of the nature of sophisticated cognition than they did before the verbal protocol approach was employed extensively by cognitive psychologists. Moreover, when verbal protocols are used to assess processing, the assessment is much more driven by what is in the head of the reader, writer, or problem solver than by what in the head of the individual constructing the assessment instrument. For example, a multiple-choice item to assess whether inferencing is occurring during reading includes one logical inference, based on the item writer's perspective. The inferences an item writer makes, however, are not always the ones any given reader makes. Some readers may fail an item tapping inferencing not because they are not reading actively and making inferences but because they are not making the inferences the test constructor made. In short, I believe that verbal protocols may permit assessments of processing that are much more realistic than the assessments of the past.
Meta-Analytic Summaries of Cognitive Processes and Behaviors

There has been an explosion of interest in the past 15–20 years to find ways to summarize findings from a large number of studies. Much progress has been made in the development of meta-analytic procedures for quantitative data. In contrast, there has been little progress in finding ways to summarize qualitative outcomes.

I believe that many of the analytic procedures (Miles & Huberman, 1994) that can be used to organize qualitative data in individual studies can also be applied across studies. Pressley and Afflerbach (1995) used one approach, grounded theory analyses based on the method of constant comparison (Strauss & Corbin, 1990), to organize the data in verbal protocols of reading. I am looking forward to much more complete grounded theories of problem solving and composition processes in the near future, for the fairly large think-aloud literatures on problem solving and composition are now being analyzed by others using procedures similar to those Afflerbach and I employed. I hope this is the start of a trend.

I also think that the methods used by Pressley and Afflerbach (1995) will prove more broadly applicable, perhaps useful whenever complex behaviors are reported categorically across a number of investigations. With the expansion of qualitative methods in general, many complex processes and behaviors will be studied qualitatively, with a number of problems studied in a large number of studies. It is essential to find ways to summarize the data collected in these efforts and thus, Pressley and Afflerbach (1995) is probably the first in a long line of qualitative meta-analytical investigations.

Concluding Comment

My colleagues and I have never been afraid to break with traditional methodologies if there was promise of conceptual advance. In general, although others have embraced our findings, they typically have not followed our methodological leads. One reason is that my associates and I have never shied away from labor-intensive methods, ones requiring more data collection and more intense data collection than often occurs in social sciences and educational research—for example, my work on monitoring of strategy efficacy (e.g., Pressley & Ghatala, 1990; Pressley, Levin, & Ghatala, 1984) and the research on transactional strategies instruction (e.g., Pressley et al., 1992). Another is that I never really saw myself as a methodologist and thus, did not attempt to impress my methods on others. This time, the analyses are as labor intensive as ever, but I am more determined to
persuade others of the power of the methods my associates and I are using. I believe that there will be real advances in understanding of complex cognitive and behavioral processes if others do follow the leads of Wyatt et al. (1993) and Pressley and Afflerbach (1995). A great deal was learned about conscious text processing in the work summarized in this chapter. Moreover, the efforts to do meta-analyses now will pay off in less diagnostic effort in future research as well as more valid standardized assessments. The promise is great for empirical and theoretical advances as well as for practice.

REFERENCES


Pressley, M., Ghatala, E. S., Woloshyn, V., & Pirie, J. (1990a). Being really, really certain you know the main idea doesn’t mean you do. Yearbook of the National Reading Conference, 39, 249-256.


