THE LIVING CASE: SEARCHING FOR A DEEPER STRUCTURE IN THE CASE ANALYSIS PROCESS

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ABSTRACT

One of the primary methods of instruction in business disciplines is the case. However, in its current form of written presentation, some of the basic learning goals associated with case instruction are compromised. We have used new forms of media involving computing and communication to build a novel learning environment, *the Living Case,* which flexibly and interactively presents cases alongwith provide dynamic, on-going feedback to students analyzing a case. In our research we have formalized the process of analyzing a case in order to recognize and interpret student analysis behavior so that provide relevant assistance can be provided. Case analysis is characterized as a problem solving activity driven by comprehension and reasoning operators. A search for these operators led us to build an inventory of reading activities. Twelve hours of protocols are analyzed using "retelling profiles" as an interpretation mechanism. Retelling profiles are visual time plots of the activities undertaken in a reading task. Our preliminary results suggest a deeper structure to case analysis which is common across business disciplines, cases, and individuals. Differences between the analysis strategies of experts and novices are also formalized. Finally, an expert's analogical reasoning strategy using task-specific knowledge encoded as "templates" is identified as a major contributor to their efficiency in solving cases. Templates of typical company situations and responses are triggered early in the analysis process, and subsequent data gathering and reasoning is directed by an attempt to apply the template to the case situation.

THE LIVING CASE:
Searching For A Deeper Structure In the Case Analysis Process

The case method of instruction is fundamental to teaching in business and other professional disciplines (eg. law). It is known for the complexity of issues that accompany its design, use, and evaluation -- not only does it require specific classroom skills on the part of the instructor and analytic skills on the part of the student, but case construction itself is an art. Many of these complexities are attributed to the diverse range of teaching and learning objectives associated with the case method [Christensen 81; Argyris 80]. One primary goal is the development of reasoning in students by teaching them skills of problem identification and diagnosis. The case method, as implemented currently in a classroom setting, requires students to read and analyze a written case prior to the class meeting, followed by a group discussion about the case solution and analysis led by the instructor.

The pragmatic long term goal of our research is to build a new environment for the delivery of business cases that relaxes some of the constraints of the present method. This research goal supports a more dynamic case analysis environment where the student's analysis and solution can be critiqued and corrected, *on-going*, as the analysis proceeds in real time. Key to this is providing feedback to the student that is customized to his or her particular need. Our primary aim in the research presented here is to be able to recognize and interpret a student's behavior while he or she is analyzing a case, and to provide relevant assistance towards solving the case at hand. This requires constructing a computational model of case analysis activity.

As part of this effort, we set out to understand the ***process of case analysis***. Case analysis is an unstructured domain where expertise is not well defined and steps to reach a final solution are not well specified. In such domains, it is useful to explicate the *process* of performing the task, here the process of analyzing a case. Understanding the process of analysis will help in tracing the mental schema and logic that guide a student's case solution. This will permit diagnosing the reasons for shortfalls in analysis. We have studied business case analysis protocols with the aim of gaining insight into the models and strategies used for case analysis.

The paper is organized as follows. Section 1 critiques the case method of instruction. Shortcomings of the current implementation of case instruction are used to develop a novel approach to the delivery of cases, which we call ***the Living Case***. Section 2 presents a conceptual model of case analysis based upon conclusions from secondary data analysis and expert interviews. The domain of case analysis is characterized and cast as a *comprehension and reasoning activity*. Section 3 summarizes interpretations from twelve hours of case analyses protocols. It examines the analysis process based on *cognitive activities* undertaken while reading a case. Cognitive activities are inferred from *retelling profiles*, which are aggregate representations constructed from observing the sequence of reading activities. Section 4 incorporates the concept of *analogical strategies* adopted by experts to analyze a case efficiently. Early in the analysis process, experts match the case facts to a *template* *of typical company behaviors* which they have constructed from experience in their memory. Subsequent analysis is guided by a motivation to verify the applicability of the template to the current case scenario. Section 5 concludes with a description of future research agenda for achieving our objectives in this domain.[1]

1. BACKGROUND

1.1 The Business Case Analysis Domain: A Critique

A major portion of the development for case[2] curriculums occurred at Harvard Business School. Since then, design and use of cases has evolved and has been fine tuned to business education. However, the methods of case presentation are based primarily on a written linear format. It is our position that the opportunities for improving the delivery of case material, when this constraint is relaxed, have not been fully explored. This research attempts to improve the process of case presentation and analysis by the use of newer media and communication methods.

In their current form, cases are written documents, varying in length from a few to several tens of pages, often with tables, charts and other forms of data. In comparison to real business situations, current classroom implementation of written cases have the following shortcomings:

* *Sequential presentation of material:* Case documentation tends to be linear in structure, often following a time or simple story line. This linear presentation does not facilitate making rapid associations or comparisons among the details of the case.

* *Organized exposure to information relevant to the business situation:* The case material presented is selective, focused and reasonably consistent -- an artifact of the written medium. Reality is chaotic, complex, dispersed and inconsistent; order in this situation must be imposed by the observer.

* *Limited contact hours for teacher instruction:* In the current set-up, a teacher either evaluates case solutions submitted by students or leads a class discussion involving the groups' analysis. The varied perspectives and approaches taken by different members of the group in identifying and diagnosing a problem from the same case material is a major contributor in building each student's repertoire of analysis skills. So although there is ample merit in retaining this form of interaction between a teacher and the group, there is no reason why it can not be augmented by machine intervention. There is need to supplement classroom group instruction with critiques of individual analysis.

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[1]This paper represents a report from an on-going research project. Should it be selected for the conference, we would propose to present it in conjunction with a demonstration of the actual system or the system in use by a subject.

[2]A case is:
".... a record of a business issue which actually has been faced by business executives, together with surrounding facts, opinions, and prejudices upon which executive decisions had to depend." (Gragg, 54)

* *Static representation of case materials:* In the current format, case material is static - it does not change based on actions the student takes during reading and analysis. There is no interaction with the student in terms of feedback that provides guidance or assistance during analysis. Feedback provided dynamically as the analysis proceeds is valuable in reorienting the *process* of analysis as opposed to merely the final solution. This lack of feedback undermines the case philosophy of providing a simulated situation where each analyst can learn from mistakes in a what-if kind of exercise.

In short, current methods for presenting and teaching business cases have limitations. The selection of material to be included in a case and the structure imposed on it by the case author prompt the student in problem identification and diagnosis. The student is led to reading the written sequence, which often contain cues to the appropriate data gathering and analysis sequence. Thus, although case instruction purports to teach these skills, case materials do not facilitate it in an unbiased way.

Chi and Greeno (87) have described this kind of approach as *directive and guided techniques* for teaching. We believe that this method does not adequately support the learning objectives of case instruction, which has a major goal of teaching problem identification, diagnosis and solution. Students conduct a realistic analysis in the simulated business world of a case. Learning is expected to take place when students apply their procedural knowledge, processing logic and inferencing skills to massage case facts into a solution. When students independently analyze a case by applying prior skills, they appreciate the process and intricacies of problem identification and diagnosis in a decision situation. However, as we illustrated, the current form of written case presentation directs and guides the student towards which data to consider important in analysis, and biases the student towards the inferencing sequence in-built in the case narrative. The cueing and prompting inherent in the inflexible format of the written case detract from developing the student's independent case analysis skills, thereby compromising the objectives of case analysis.

Learning by discovery is often advocated in the teaching literature as an effective approach for domains where inference and induction skills are important [Eysenck 84; Taba 66]. Students are allowed to gather their own data, form hypotheses about problems and solutions, and then accumulate confirming or refuting information. Advantages of the independent discovery approach in the long term development of a student's conceptual thinking and processing logic have been stressed by many researchers in the education area [Bruner 56; Norman 84; Johnson 83]. A more flexible, active and interactive approach to case presentation is needed. The philosophy of case education will be well supported by such an approach. Our objective is to investigate an implementation of the case method of instruction which is more conducive to learning by discovery than the current methods of presentation. The *Living Case* is a concept that provides for flexible and active case presentation, thereby promoting the discovery approach to case education.

1.2 Living Case: A Novel Approach to Implementing the Case Method

We believe that new technologies present an opportunity to implement some of the improvements suggested by the above pedagogical discussion. For example, a personal computer can be used as a delivery vehicle for cases, permitting the use of color, graphics, sound, and manipulable business data and textual materials. The ***Living Case*** is a case instruction system that has been designed to administer some of the notions for learning by discovery. It has two subsystems:

* Case-Delivery, and
* Student-Tutoring.

The ***Case-Delivery*** subsystem is an approach to implementation of cases in which text and other data is organized in a more flexible and non-directive format when compared to cases written on paper. The ***Student-Tutoring*** subsystem is the mechanism that monitors the student using the Case-Delivery subsystem to analyze a case. It records the student's analysis behavior, interprets the rationale or model prompting the observed analysis behavior, and attempts to reorient the student's analysis in the right direction. Thus, the Student-Tutoring subsystem is the mechanism that ensures transferring the potential learning benefits of the novel Case-Delivery implementation to the student. We believe this conceptualization of the Living Case is conducive to augmenting classroom case teaching by providing skills required for decision making in real business situations. The Case-Delivery subsystem is briefly described here. The remainder of the paper investigates the design of the Student-Tutoring subsystem.

The Case Delivery subsystem begins with the case writer. He/she sits at a computer terminal and writes a case in much the same way as a text editor would be used to prepare a normal written case. As part of this process the case writer enters into a dialogue with the Case-Delivery subsystem. He specifies to the system (1) the segments and subsegments[3] into which the case can be decomposed, (2) the concept that identifies or illustrates

[3]Segments are high level divisions, or partitions of the case, that are strongly related. They express a unified idea or theme. Often a paragraph, section, or subsection is designed using similar guidelines. In this context, a segment would signify an idea or concept relevant to the vocabulary and theory of the business discipline (or, subdiscipline) to which the case pertains. For example, one segment might be an interview with an actor in the case, or the description of a time series of events, or a financial data set, or competition information, or product costing data, and so on.

the segments, and (3) the linkages between segments and subsegments that determine a unifying theme or a logical progression of ideas relating to the case concepts. The system builds an index of segment concepts and a hierarchy of segments, subsegments, as well as concepts, based on author specified linkages.

The student or analyst using the Case-Delivery subsystem is the person reading the case with the purpose of analyzing it. He\she sees a screen with three windows. The upper window contains the written text material of the case. A second smaller window contains commands and messages as icons and menus. The student can view the text segment by segment as one would in a logically written normal case. Or, the student can jump to related material located elsewhere in the case, (identified in reverse video), using hypertext techniques, command options, and choices of index\hierarchies that were built during the case writing dialogue. Markers can be left in the text and a command option enables the student to return to the marker at any future time during the analysis. At any time, inquiries can be made about what material has already been viewed, and this is displayed symbolically on the index. The third window contains a notepad for the user to write on. This is meant to serve as a "highlighter" for case facts that the student considers important to remember.

An experimental prototype of the Case-Delivery system has been implemented using Pascal on a PC. The system simulates the Case-Delivery interface for an existing, already authored case (*Blue Shield of Massachusetts, 1983, #HBS 9-184-018]*. This user interface of the Case-Delivery subsystem is available for reading and viewing the case flexibly according to the student's choice. The system can track and maintain the student interactions with the case. It monitors and records the segment viewing sequence, the commands used, and the notes and calculations made by the student while analyzing the case. Initial experiments with subjects using the system are encouraging. In spite of the slight inconvenience caused by reading screens of textual material for long periods of time, the subjects reacted positively and smoothly to the requirement of gathering case information flexibly and in a non-directed manner.

1.3 The Student-Tutoring Subsystem: Research Perspective

The Student-Tutoring subsystem aims to utilize the record of student interactions on the computer terminal to interpret the student's case analysis model and rationale. For this, we need to specify (1) the elements of student behavior that can be interpreted to understand the rationale behind the student analyses, and (2) primitives of the case analysis process that can be used to construct a desirable model for "good" case analysis . These elements of student behavior are signals that can be captured as the student interacts with the Case-

Delivery subsystem while reading and using material from the case to be analyzed. A perfect log of terminal interaction produces too much extraneous information. So a major goal of this research is to identify the computational model that permits translating this data to a level that has reasonable interpretation power.

Specification of the primitives of case analysis requires knowledge about the way experts approach analyzing a case and use the information presented in identifying underlying problems and forming action solutions. We need to represent an experts' knowledge of facts and procedures required to solve problems in this domain [Turner 91]. In short, the Student-Tutoring subsystem should have a model of the **expertise** in the domain of case analysis as well as the domain of the case itself. Note that the primitives of expertise in case analysis will need to be specified in terms common across business disciplines. In fact, during our initial study of the case analysis domain, it was not at all clear that there existed commonality in the underlying structure for case analyses in diverse disciplines like quantitative Accounting and qualitative Business Policy.

The third research question important for designing the Student-Tutoring subsystem concerns a *mapping* between the interaction signals captured via the terminal and the case analysis primitives prompting them. Once we know which interaction signals to capture and what case analysis primitives to diagnose, we still need to specify a scheme that translates from observed interaction signals to case analysis primitives.

The theoretical background that provided guidance for observations and modelling objectives in our research design derives from work in the related areas of User Modelling and Intelligent Tutoring Systems (ITS). ITSs are computerized implementations which offer many of the features appropriate for the Student-Tutoring component of the Living Case concept. Research on ITS has attempted to continuously monitor a student's learning so that teaching and feedback can be tailored to the individual student's needs while learning is actually taking place i.e. they can dynamically adjust teaching [Sleeman 82]. A 'user model' is a vital component of any such system which aims to dynamically individualize its user feedback. The system constructs a user model by utilizing signals from the user's interaction with the system. User models are abstract representations of each individual user along dimensions relevant to the task domain under consideration [Rich 83]. Techniques for creating effective user modelling components in ITSs have been developed and utilized in many systems [Kass 87; Sleeman 82; Self 74]. A prerequisite to designing an ITS and specifying a user model is an "expert module". In the context of case analysis, this coincides with the objective of specifying the primitives of expertise in case analysis.

The remaining paper reports the results of our research for investigating the analysis primitives, the interaction signals, and the most useful mapping schemes between them in the case analysis context. Our efforts are directed towards constructing a model of expertise which specifies the *process* by which a case is analyzed: the way expert analysts approach analyzing a case and use information in identifying underlying problems and forming action solutions. These primitives of case analysis are conceptualized as a classical problem solving task in the tradition of Newell and Simon's work (72). The notion being that case analysis primitives can be identified in terms of *case reading protocols*. A taxonomy of case reading activities is tested as potential input signals which can be used to interpret analysis behavior. The scheme for interpreting reading activities as analysis behavior requires aggregating the reading activities at the level of *cognitive processes* and *problem solving strategies*. If we can observe the reading behavior of an analyst and predict the analysis rationale prompting it, then a computational model (like the Student-Tutoring subsystem) can be built. Reading traces can then be used to profile the analysis process.

2. CHARACTERIZING PRIMITIVES IN THE CASE ANALYSIS PROCESS

In order to explicate models for the case analysis process, we begin by characterizing the analysis domain in terms of the general category of tasks and procedures it involves. This first phase of our research was primarily directed at finding the factors that define and identify a "good" case analysis as well as those that make it difficult to do so. In addition, we wanted to get a feel for the validity of claiming a deeper structure for case analyses that was common across disciplines.

In order to arrive at our model of the case analysis process we distilled material from an analysis of teaching notes that accompany business cases and semi-structured interviews with experts using business cases for teaching in their courses. We interviewed seven faculty members in the areas of Accounting, Business Policy and Operations Management from the business school at New York University. The faculty experts were asked to describe their views of a good case analysis. Each of the interviews lasted between 20 minutes and 45 minutes. The following represents our view of the analysis process.

2.1 An Indeterminate View of the Case Analysis Process:

The major difficulty in specifying primitives of the case analysis process is the numerous degrees of freedom allotted to "good" analysis. Responses of the experts and reviews of the teaching notes suggest that case analysis does not have an algorithmic procedure that can be reduced to a step by step routine guaranteed to provide a right solution. Our interviewed indicated the prevalent view that quantitative and qualitative case analyses had different flavors and processes. However, faculty member descriptions of distinguishing factors that contributed to indeterminism were *consistently* in *consensus*. The major factors cited were:

* *Multiple correct answers:* Most teachers spend 75% of class time discussing issues and "painting a picture", and only 25% time discussing the case solution. Their main objective was to ensure that students notice the right red flags and recognize the significant features of a case relevant for making inferences. Different students could have radically different solutions to the same case; yet their analysis could be judged at par if logically supported with relevant facts. It is the *process* of arriving at a solution that is important, not so much the solution itself; moreover, there are multiple paths of arriving at solutions that are judged equally good.

* *Centrality of context and semantics:* The issues and facts in a case lead to an inference only as a group, not in isolation. The significance and implication of a case fact can be judged only in the context of other situational facts[4]. In the context of our objective to specify a model of case analysis expertise, this means that domain knowledge is not in the form of time invariant logical implications from facts, but instead it is contextual, combinational, and probabilistic. There can exist no cookbook of answers in the case analysis domain.

* *Story understanding kind of comprehension:* Teachers are more interested in developing the students' ability to sketch a cohesive account of case events, richly embellished by both, past knowledge and experience of the student, and the unfolding of relevant facts in the current case. Their aim appears to stress skills of comprehension and integration of evidence in students. This skill helps in combating the natural limits of human memory. The result is that case analysis is classified in terms of generalities, rather than as a precise, predictable procedure amenable to formal specification.

In the absence of narrowly restricted do's and don'ts, right and wrong paths to a solution, and indeed, one correct answer to the analysis, it becomes difficult to model case analysis in a precise manner. As a result, we found it more useful to cast case analysis at a more general and abstract level.

2.2 Case Analysis as a Problem Solving Activity

In spite of the ill-structured and ambiguous nature of a "good" case analysis, further investigation did suggest some structure might underlie this process, albeit at a very generalized and abstract level. Our interviews and analysis of teaching notes [Matejka 81; Ronstadt 77] indicated that the most frequently described procedure for

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[4]For example, "Fierce competition + market share going down" could imply price cutting measures as a solution. But, "Fierce competition + market share going down + dominant image of own brand" might justify an inference of more aggressive promotions as a solution.

case analysis consisted of:

(1) read the case,

(2) extract significant highlights from the business situation,

(3) identify the problem,

(4) generate alternate course of action (solutions), and

(5) evaluate alternate decision solutions.

Steps 1 and 2 require the student to understand the scenario *as described by the facts of the case*. Step 3 requires the student to infer a problem *not explicitly stated in the case*. Step 4 requires the student to generate alternate plausible actions to the case scenario (of Steps 1 and 2) till one produces an outcome *"desirable" from the case analysis point of view*. Step 5 requires the selection of one or more courses of action.

An understanding of the objectives behind these steps uncovers a deeper structure in this procedure. We interpret the above process description as a generalized *problem solving* method. In this perspective, case analysis can be modelled along the lines of Newell and Simon's (72) characterization of human problem solving. Problem solving is described as beginning with an *initial state* (of problem facts) and ending at a pre-defined *desired goal-state* (of solution facts). *Operators* are applied to the initial state to produce intermediate states (figure 1). Operators are selected based on their ability to reduce the difference between initial state and goal state. Each new intermediate state has a reduced difference from the desired goal state and is treated as the initial state for the next iteration of operator application[5]. But such a formulation does not permit backtracking.

INSERT FIGURE 1 ABOUT HERE

To recast case analysis in terms of problem solving primitives, Steps 1 and 2 require the student to construct the INITIAL-SITUATION, as described by the case facts. Step 3 requires the student to understand the dynamics and make better sense of the INITIAL-SITUATION by identifying a problem that explains the constellation of facts in the INITIAL-SITUATION. Step 4 requires reasoning from the INITIAL-SITUATION

[5] An example to illustrate these concepts would be of a person solving the problem of going from his home in New York (NY) to Los Angeles (LA). The initial state is his presence at home in NY and his desired goal state is his presence at LA. The distance between the two cities can be reduced with a transport (the operators). An available transport is his car to get him to NY airport and reduce his distance. His presence at NY airport is an intermediate state. In the second iteration he would try to reduce the distance between NY airport and LA by choosing an airplane as a transport operator.

to a DESIRED GOAL-SITUATION by applying alternate actions. This required reasoning is analogous to the operator application phase in figure 1; thus, we call them 'REASONING OPERATORS'.

2.3 Case Analysis as a Comprehension and Reasoning Process

In the context of case analysis, it is not clear how an expert identifies the specifics of the INITIAL-SITUATION. In domains like physics and algebra, the initial problem description is precise, concise and manageable in volume. In the case analysis domain, the INITIAL-SITUATION is voluminous and general. The operative INITIAL-SITUATION that actually participates in the problem solving is *actively constructed* as the case is being read. A complete INITIAL-SITUATION exists in the analysts' mind only after the entire case is read and case facts considered relevant are identified or abstracted. It should be noted that the entire case has far too many facts for the analyst to keep track. Limitations of the human short-term memory as an information processor have been well documented [Cyert 63]. It would therefore be reasonable to expect that the INITIAL-SITUATION, as described by the case facts, is continuously *abstracted* so as to maintain it in a more concise and summarized form. Our observations suggest that the abstracted situation is a more condensed version of the INITIAL-SITUATION. This abstraction would combat effects of memory overload resulting from excessive amounts of case facts being read [Norman 84]. Recall that teachers using the case method stressed skills involved in the comprehension and integration of evidence (Section 2.1). The efficiency of the abstraction process will depend greatly on these skills. Following from the above discussions, figure 2 presents a modified model for case problem solving incorporating the notion of an ABSTRACTED-SITUATION.

INSERT FIGURE 2 ABOUT HERE

We introduce the notion of COMPREHENSION OPERATORS as a means to achieve the transition from INITIAL-SITUATION to ABSTRACTED-SITUATION. These operators need to be differentiated from the REASONING OPERATORS introduced earlier, which apply to the transition from ABSTRACTED-SITUATION to GOAL-SITUATION. A review of literature from the reading comprehension area distinguishes between comprehension and reasoning. Comprehension is described as "understanding what is read in the lines" while reasoning refers to the abstract ability of "extracting meaning via reading between the lines and reading beyond the lines in a hypothetico-deductive manner" [McCarthy 76]. We find this description very useful in differentiating and conceptualizing the two transition processes identified in figure 2. The INITIAL-SITUATION is merely re-encoded using COMPREHENSION OPERATORS into a more concise ABSTRACTED-SITUATION, which in turn is transformed using REASONING OPERATORS to the final DESIRED-SITUATION. It is the application of these operators that drives the case analysis process. One of the major objectives in the remaining paper would be to search for and formulate these two sets of operators.

We have cast case analysis as primarily a process of applying comprehension and reasoning operators to the facts of the situation. If it is the application of these operators that produces a successful case solution, then a record of the sequence and frequency of operator application could provide valuable clues to the analysis rationale of the subject. The operators could, therefore, function as interaction signals for us to track and record via data from the monitor record (Section 1.3). In the next few sections we will search for and validate a list of such operators applicable to the case analysis process.

3. SEARCH FOR OPERATORS IN THE CASE ANALYSIS PROCESS

The search for operators that effect the transition from INITIAL-SITUATION to GOAL-SITUATION in case analysis requires a more detailed understanding of expert problem solving behavior. We need to model the comprehension and reasoning processes of an expert case analyst at a finer level of detail than that described in the prior sections. The strategies an expert brings to bear on successfully solving a problem reflect important regularities and invariants in the task environment that are not explicit, and are learned after many years of practice and internalization [Hayes 76; Todd 87].

We analyzed twelve case analysis protocols to help model the process of analysis. Protocol analysis is a process tracing method that attempts to discover the dynamics of problem definition, hypothesis formulation, information search, and decision phases of human problem solving [Ericsson 80; Todd 87; Turner 90]. It involves recording the spoken articulation and actions of a subject during task execution and analyzing them at a later time. The notion is that it provides access to what information a subject examines, the manipulations conducted on this information, input stimuli, and the evaluations and assessments made. Concurrent protocols involve having subjects to "think aloud" during actual task execution. Scoring, or tabulating frequencies of certain key items of interest, is one of the methods that can be used to analyze the resulting think aloud protocols. The objectivity of scoring and the generation of the coding scheme based on a priori hypotheses are some of the major factors that need to be ensured for this method to produce reproducible results.

Twelve think-aloud case analysis protocols, six each from the areas of Business Policy and Accounting, were tape recorded. The subjects were experts in their fields and were chosen to represent three groups: quantitative experts (from Accounting), qualitative experts (from Business Policy), and student experts (from Business Policy). The student experts were identified by the faculty member in charge of the relevant course as being an expert case analyst. Each protocol consisted of the analysis of a short case in the subject's area of expertise. All qualitative area subjects analyzed the same case (from Accounting) and all quantitative area subjects analyzed the same case (from Business Policy). We label these groups "quantitative" and "qualitative" in the most general meaning of the terms and in keeping with the colloquial references to the respective disciplines within the business school. This terminology is not to be confused with the presence of both qualitatively and quantitatively trained experts within the same business area.

3.1 Methodology: A Taxonomy of Reading Activities

The recorded protocols were analyzed in terms of the reading activities undertaken by each expert. In order to build an a priori coding scheme, a preliminary list of reading activities was constructed from a review of the reading literature. We borrow from the work of Harste and Burke ('78) which developed a framework of activities which were capable of representing any reading task. Seven different types of activities are involved in reading and understanding any text. These range from "restating" text in the reader's own words to "confirmation/dissonance" which involves the reader searching for cognitive meaning. (See items 1 - 7 in Table 1a). During later scoring, we found that certain portions of the protocols we tape recorded could not be classified as any of these seven activities, thus calling into question the completeness of Harste and Burke's scheme. An example would be "this company might be operating in a recessionary industry". To accommodate such specifics of the case analysis task and to make the list of activities representative of classifying the analysis protocols, we added two activities to the list of these seven. Table 1b lists our proposed additions to the inventory of reading activities. Closure was established when the list was capable of exhaustively classifying each line of all protocols into one or another reading activity.

INSERT TABLES 1 & 2 ABOUT HERE

A closer look at the behaviors that prompted each of the reading activities shows that they correspond to comprehension related and reasoning related processes. The descriptions of the activities are based on Harste and Burke's definitions. Based on definitions of the comprehension and reasoning processes (Section 2.3), we classified the expanded list of nine reading activities into two categories: reasoning related activities and comprehension related activities. Table 2 presents this classification of activities along with their description.

INSERT TABLES 3 & 4 ABOUT HERE

As the first step, each line of each protocol was classified as one of the nine reading activities of table 2. Tables 3 and 4 use selected portions of protocols to illustrate the protocol scoring scheme. As the second step, this resulting listing of reading activities for each protocol was used to construct a *retelling profile* for each protocol [Harste 78]. A retelling profile is a time trace of the reading activities undertaken by the subject as he reads through and attempts to understand the case. Visually, the profile is a plot of time on the X-axis versus the reading activity undertaken on the Y-axis. It very succinctly displays the routes which the reader travels in an effort to construct meaning and analyze the case. Retelling plots basically indicate types of cognitive activity undertaken as analysis proceeds. The amount of cognitive activity involved in a reading task is a function of the frequency of switch among the different activities. A smooth curve signifies that changes in cognitive activity are minimal and the subject is not engaged in high levels of cognitive processing. This could have one of two explanations. Either the subject is not attempting to understand, or not capable of understanding the text at all, and therefore not many reading activities are getting triggered. Or else, the subject is well-versed in the domain of the text being read, and therefore does not need to engage in much cognitive processing in order to understand the text. Most often, an evaluation of the quality of the resulting analysis/solution can help in differentiating between these two cases. Similarly, an erratic or widely fluctuating curve could mean that the text itself is difficult to understand, or, the subject is have difficulty in understanding the intricacies of the text. Generally, a comparison of the retelling profiles of a number of subjects for the same text can help in concluding which reason is a plausible explanation for this shape of the curve. Note that the sequence of stacking the reading activities determines the visual look of the curves. Since the amount of cognitive activity is a function of the *frequency* of switch between the different activities rather than the distance of switch, the interpretation of the profile should be based on the number of peaks rather than the height of peaks. If this factor is kept in mind during analyzing the retelling profiles, it does not really matter which stacking order is chosen for the plots.

Our goal is to aggregate reading activities over some time span larger than a single line. These meaningful chunks of analysis behavior could help in understanding, at a useful level of granularity, the mental processes displayed by the subject in different phases of analysis. As the final step of analysis, we compared retelling profiles of the different groups of experts in our sample: qualitative, quantitative and students, observing similarities and differences in the activation and sequencing of cognitive activity.

For our objective of implementing a computerized Student-Tutoring module, these activities provide a blueprint for recognizing broad categories of user behavior. For example, we believe that subjects who are lost and subjects who converge on important concepts in the case can be recognised.

3.2 Interpretation: Differences and Similarities in Case Analyses

Figures 3a, 3b and 3c are a schematic presentation of retelling profiles for the three groups of experts in our sample. They are schematic in the sense that they depict only the general trend of each profile curve. It was necessary to choose this summarized form of presentation in the interests of brevity. The figures plot comprehension related and reasoning related activities stacked up as two separate groups on the Y-axis and time (into *reading*) as the X-axis. We chose to group these activities together on the visual plot in order to make our observations clear to any reader. However, as explained in the previous section, the imposed ordering does not bias results or conclusions in any way. A retelling profile can extend beyond 100% time, which means that time for *analysis* usually extends beyond the time taken to read through the entire case. This would be post-reading reflection time needed to further make sense of what was read.

INSERT FIGURE 3 ABOUT HERE

The research started out with only two sets of experts: qualitative area experts and quantitative area experts. As mentioned earlier, the three students from the qualitative area had been identified by the faculty member teaching their relevant courses as "very good, very mature". Therefore we regarded them as qualitative experts and originally planned to analyze their protocols grouped together with other experts. However, we found their retelling profiles consistently different from the qualitative area faculty experts. In addition, the student profiles had an underlying pattern that was common among them and distinctly different from faculty experts as a group.

Accordingly, we treated them as a separate group and report on their analysis behavior separately. This finding has an important significance from the student tutoring point of view. It means that a system can track retelling profiles via interactions on the terminal as a basis to differentiate between students and experts. The major observations and comparisons between the three groups of subjects analyzing the case are summarized below:

(1). **All Experts:** Very soon in the analysis process their retelling profile shifted from comprehension to reasoning related activities. In fact, once in the reasoning phase, almost no more comprehension activities were undertaken. Verbatim reading of the case were then the direct inputs to the reasoning operators (as opposed to comprehended, abstracted versions of what was read)[6]. Experts have a reasonably smooth curve and do not seem to exhibit high amounts of changes in cognitive activity in terms of widely fluctuating curves. The quality of expert analysis was good by definition, therefore it would be reasonable to conclude that the experts were rather well-versed and capable of performing the analysis task presented to them. In this context, a smooth retelling curve indicates that the expert subjects were having an effortless, easy time in extracting meaning from the text being read.

(2). **Experts Analyzing Qualitative versus Quantitative Cases:** Our experimental design administered a different case for analysis to each of these two groups. Therefore, the observed differences between the groups cannot be conclusively explained: differences could result from differences in the nature of the cases or from the nature of the expertise in the two groups. The observations summarized here are therefore of a conjectural nature. The overall character of the profiles is almost identical. The only differences arise from the lesser use, by quantitative experts, of comprehension activities in Phase 1, and the larger use, again by quantitative experts, of the DEDUCTION/INDUCTION activity in Phase 2. We believe this results from the nature of the case being analyzed rather than any differences in the abilities or analysis strategies of the subjects in the two groups. The quantitative case was oriented towards financial statement analysis requiring many more calculations using equations/relations. This is classified as a DEDUCTION activity. In addition, in financial statements analysis cases, the text is often lesser and more direct than many Business Policy cases, since interpretation of the numeric values is stressed. So the comprehension phase could be somewhat less demanding in understanding the case.

(3). **Experts versus Students:** This comparison yielded the most interesting contrast. Students remained

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[6]Since verbatim reading has not been included as an activity in the taxonomy of activities, it does not show up in the retelling profile.

performing comprehension activities until the very end of the case, with very sporadic use of the EXTENSION activity. Subsequent to reading and comprehending the entire case, they engaged in concentrated DEDUCTION/INDUCTION activity. The amount of changes in cognitive activity displayed by students is also much higher than experts (a much more fluctuating curve). Since the same text, i.e., the case, did produce a smooth curve in another group (the experts in figure 3a), it would seem reasonable to conclude that the student subjects were having difficulty in analyzing the intricacies of the case. In this context, the non-smooth curve indicates that students struggled and worked more than experts in analyzing the case. The erratic, widely fluctuating nature seems to imply that their quest for meaning in the text appeared to be very undirected and rather unfocussed.

In sum, experts seemed to analyze cases in two phases: a short phase involving comprehension and a longer phase involving reasoning activities. Once in the reasoning phase, expert subjects remained in that phase rather than return to comprehension. This suggests they were adding to their cognitive models of the analysis process. Expert analyses in qualitative and quantitative areas share significant commonalities in the general process. Students differed from experts by remaining in comprehension activities over the entire case reading session and then beginning concentrated reasoning activities only at the very end.

3.3 Implications for the Case Analysis Process

Observations from the retelling profiles has allowed us to make considerable headway in specifying the case analysis process in terms of problem solving primitives. If a system can interpret the reading activities undertaken by a subject while analyzing a case, it may be able to identify the problem solving that the subject is engaged in. Moreover, the profile of reading activities undertaken could also serve to distinguish among subjects with different levels of skills. Most importantly, our work suggests that case analyses in areas as diverse as Accounting and Business Policy may share a deep underlying structure that is common at the level of a generic problem solving process.

4. IMPOSING STRUCTURE ON THE CASE ANALYSIS PROCESS

However, from a student tutoring point of view, we have not explained the sources of differences in behavior between novices and experts. What mental model or strategy causes an expert to switch at an early stage from the comprehension phase to the reasoning phase? What lower level processes trigger higher level mental activities? Is there any uniformity between the text element read and the resulting cognitive activity?

4.1 Unexplained Intricacies in the Retelling Profiles

In order to answer some of these questions, the contents of the retelling profiles were analyzed further. Our aim was to get a better sense of what triggers specific cognitive activities. The ideal scenario would be to find a regularity in the relationship between the text read and the resulting activity. In that case, a system that aims to track the behavior of a subject can extrapolate from the type of text read to the cognitive activity that should be undertaken. This could help in building a high level *prescriptive procedure* for analyzing a case.

This detailed level of analysis revealed considerable variance in the retelling profiles. Two major kinds of variations were noticed. First, the same case fact when read by different subjects caused different cognitive activities to be undertaken. For example, the case fact "foreign imports in this industry are up from $2 million in 1974 to $30 million in 1983" prompted two experts to undertake different activities. One expert thought aloud ====> "...so now they're going to be facing price wars and quality consciousness..." (a DEDUCTION/INDUCTION activity), while a second expert thought aloud ====> "...this is another reason why they said earlier that the competitive situation was getting bad..." (a CLASSIFICATION activity). Second, often a set of case facts triggered identical reading activities in different experts, but the output of the activity was different. For example, the case fact " a single supply contract may account for up to 35% of total B&S sales" triggered two different flavors of the DEDUCTION activity. One expert reasoned "...trouble...they're very vulnerable and they'll get chewed if they don't play the price game...", while another reasoned "...oh good. With their image, they can go for big accounts, cut on distribution costs, and be one up in the price cut...".

Another unexplained observation concerned the point where experts switched from the comprehension phase to the reasoning phase. Each expert switched at a different point in the reading time line. Once in the reasoning phase, reasoning activities were triggered by entirely different case facts encountered. It was as though each expert's reasoning profile was very directed and deliberate. The expert almost waited for reading a specific case fact, predetermined by his\her own analysis strategy, before using some reasoning activity to integrate it with the existing mass of already digested case facts.

4.2 Selective Strategies During Abstraction: Analysis by Analogy

It is clear that experts have an early trigger after which they use reasoning operators in a very directed and focussed manner. Novices, on the other hand, enter the reasoning phase at the very end of the process, prompted apparently by the logical necessity to reason a solution before submitting the analysis assignment. What might explain these differences in problem solving behavior between experts and novices for case analysis?

Strategies are designed to direct case analysis with a minimum of effort, both to speed up time and reduce strain on cognitive activity. Physicians organize their findings with the help of a taxonomy of diseases, which allows them, among other things, to recognize groups of symptoms as manifestations of familiar diseases [Bouwman 83]. So instead of having to memorize and manipulate many independent items, they remember disease groups. Once a symptom reminds them of an associated disease, the remaining symptoms in that class are automatically remembered. A parallel appears to exist in the case analysis area. The retelling profiles indicate that experts, in our sample, did not analyze each situation afresh from basic principles. Instead, they seemed to jump, early on, to higher level mental functions.

Based on numerous studies of expert behavior in a large variety of task domains, the key determinant of expertise is the availability of task specific knowledge [Chi 82; Hayes 83]. Experts possess a large task-specific "knowledge base" which allows them to recognize many different situations upon which to draw as a source of hypotheses and direction [Turner 87]. These seem to be stored in memory as an image or template that characterizes typical firm behaviors. When cases and situations can be solved by recognition of previously encountered patterns, efficiency of analysis and decision making is greatly enhanced [Norman 84].

Consider for example the following extract from a protocol:

> ".....I see they (the company) have almost no competitors...monopoly...and stable industry.....I guess they might want to grow further.....let's see what they are doing with their profit margin. I bet their product costing needs work....and such companies always have good debt to equities....." (Quantitative expert subject).

This subject looked at certain information and decided it was a 'stable company'. Subsequently, alternative problems, such as low profit margin and work needed on product costing, suggested themselves a priori. In addition, certain associated case facts, such as growth objective and good debt ratios, were assumed and marked for verification while subsequent reading of the case.

Our protocols suggest that ***templates of typical companies*** are a key component of expert analysis. Research in other areas like chess, linear programming, physics, and financial analysis has also established the critical importance of templates [DeGroot 65; Newell 72; Bouwman 83; Chi 81]. A list of typical firm behaviors, often encountered in real life and in written cases, exists in the vocabulary of experts analyzing a (business) case. These templates are cast in terms of the issues and concerns relevant to the experts' business discipline. A template has many advantages. It codes different probable data categories under one convenient label: firm facts, associated problems, and workable action decisions. As the expert reads the case, a combination of case facts encountered and assimilated matches the data slots in some template. This triggers the expert to remember other data associated with that template. Subsequent analysis is then guided by a motivation to confirm the applicability of the template to the case situation.

In our model of case analysis as a problem solving activity, a template can really be conceptualized as representative of the GOAL-SITUATION. Case facts are regarded as givens in the INITIAL-SITUATION, and different templates are tested and matched to the case facts in hand. The cognitive structure of available templates is molded so as to best fit the case scenario and produce a desired GOAL-SITUATION. Thus, the expert can embark on a very directed data gathering and reasoning path, guided by the template contents. This reduces the time and effort involved in the analysis process and explains the smooth curve obtained in the retelling profiles of Figures 3a and b.

The second advantage of templates accrues after a template is confirmed as being valid for the situation, and problem hypotheses need to be generated and verified. A *checklist of firm problems* relevant to the disciplines' concerns can be associated with each template. For example, experts analyzing financial statements listed inventory valuation, debt coverage, etc., as problems that are very common with service firms. Thus, problem hypotheses, and later, action solutions are retrieved from the template in memory rather than generated and reasoned afresh. This once again replaces a reasoning process by a *recognition* process, which is faster and requires less cognitive effort [Norman 84].

A third advantage is the potential of templates to significantly improve the analysis, because they represent experiential knowledge sifted from a number of past real life and written case encounters. Note however, that templates represent only heuristic strategies which are not guaranteed to produce the optimal solution. They generate likely problems and the most probable solutions associated with the general case scenario identified.

Finally, it would be useful to cast this strategy of selecting a pre-existing template and directing subsequent analysis to verify its applicability as an ***analogical strategy***. Solution by analogy is a strategy adopted by experts in many fields [Vicinanza 90]. It enables reduction of a very complex or difficult task by recognizing similarity with an already completed task. As a result, the solution does not have to be generated from scratch, but rather, it is assumed to be the same as that for the analogical task. This is a heuristic strategy which is not guaranteed to produce the perfect solution always. But in most cases, it reduces the effort and time required for the solution and produces an acceptable solution.

5. CONCLUDING REMARKS

A number of benefits follow from the model of the case analysis process formalized in the previous sections. First, it demonstrates the existence of a deeper and common structure on a process regarded as variable between disciplines, cases and individuals. Second, it explicates a lot of richness in the case analysis process, and elevates it from a routine following of steps advocated in many outlines. Once understood, the analogical strategy followed by experts can be gainfully taught to students. In fact, it would be worth investigating whether templates can be articulated from the expert vocabularies and taught to the students, just as formulas and equations are taught today. We believe this level of understanding is necessary in diagnosing shortfalls in student-analysis and remedying them for the long term.

Although the preliminary results of our research our encouraging, they are of an exploratory nature only. We plan additional studies into the 1) nature of case analysis domain, and 2) differences in problem solving behavior between expert and novice subjects.

5.1 Implications for Implementing the Living Case

For our objective of implementing the Living Case tutor, the cognitive model developed represents one step in formalizing representation. We believe we have a sufficient understanding of the underlying cognitive processes of reading and reasoning to attempt their automated recognition based on 1) the sequence of material traversed, and 2) the system commands evoked. For example, if a subject uses a facility for INDUCTIVE/DEDUCTIVE inference, the system can "guess" that an attempt to accommodate a template to the ABSTRACTED-SITUATION is being made. Also, the stage at which the accommodation activity is being undertaken can be a clue to a gross classification of the expertise level of the subject. So, for example, if a reasoning activity is performed one-fifth into reading the case, the system can safely "guess" that the subject is not a novice in the area. Finally, it may be possible to program into the system expected activity sequences. If we know how experts read the case and at what stage the case facts should trigger a stereotypical template, the system can know when to expect reasoning activities to begin as well as their general sequence. Any deviance from this expected behavior can be tracked, and when the difference between expected expert behavior and system-user behavior is detected, the system can prompt and re-orient the user. This could permit us to accomplish the goal of providing dynamic, on-going feedback to students based on an analysis of their specific learning needs. This could form the basis for remedial tutoring of students.

We do not aim to replace classroom case teaching with the Living Case system; instead we desire to exploit flexible presentation capabilities of the case delivery subsystem and provide customized feedback which encourages the student to diagnose and solve business problems independently. The translation of the reading activities into user interface facilities needs to be analyzed in more detail. Mechanisms to ensure that the major cognitive activities are performed on the system rather than in the mind need to be constructed. Various devices can be used to encourage this. For example, facilities to highlight text, create one's own indexes to concepts in the text, prompts to record inferences on the notepad, and so on.

One important area that needs further study is the use of templates by experts. Although our observations yield evidence for their usage, we would like to build a database of useable templates in a business discipline. We need to specify the data slots, hypothesized problems and likely action solutions for a set of generic, discipline-specific templates. This would also help in specifying the points in the case that should trigger templates into the expert's consideration. We can then program into the system an expected activity sequence. A second area that needs investigation is the effect that 'level of expertise' has on the form and content of the templates. It would be useful to categorize template types according to expertise level. This would be invaluable in diagnosing and tutoring student subjects. Finally, sources of shortfalls in student analyses, for example why a relevant template fails to get triggered or triggers at wrong points in the case, need to be studied. This would provide a strong basis for remedial action with students.

5.2 Summary

The *Living Case* was designed as a method for flexible, interactive presentation of cases and dynamic, on-going feedback to the analysis of students. We attempted to understand the process of analyzing a case in order build this computerized implementation of the delivery and analysis mechanism for business cases. Our aim was to be able to recognize and interpret a student's behavior while he/she is analyzing a case, in order to provide relevant assistance towards solving the case at hand.

A search for formalizing the comprehension and reasoning operators used for analyzing cases led us to build an inventory of nine reading activities. Interpretation of the retelling profiles for experts analyzing a case enabled us to uncover a deeper structure to case analysis which is common across business disciplines, cases, and analysts. Experts engage in a short phase involving comprehension and clearly have an early trigger after which they use reasoning operators in a very directed and focussed manner. Novices, on the other hand, enter the reasoning phase at the very end of the process, prompted apparently by the logical necessity to reason a solution before submitting the analysis assignment. We introduced the concept of task-specific knowledge encoded in the form of "templates of typical company behaviors" to explain the observation of early triggers in the analysis process. This formalizing of the models and strategies involved in the process of analyzing a case is expected to help in tracing the mental schema and logic that guide a case solution. We can then diagnose the reasons for shortfalls in analysis and tailor case presentation as well as analysis feedback to the individual student's needs.

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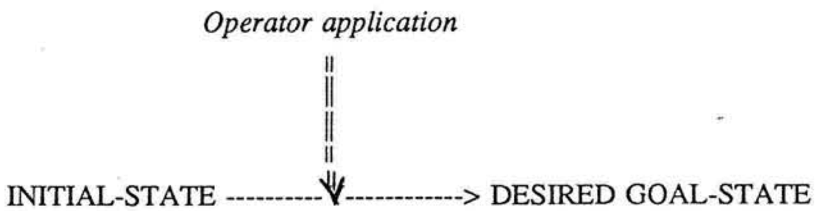


FIGURE 1: **Model for Human Problem Solving (adapted from Newell and Simon, 72)**

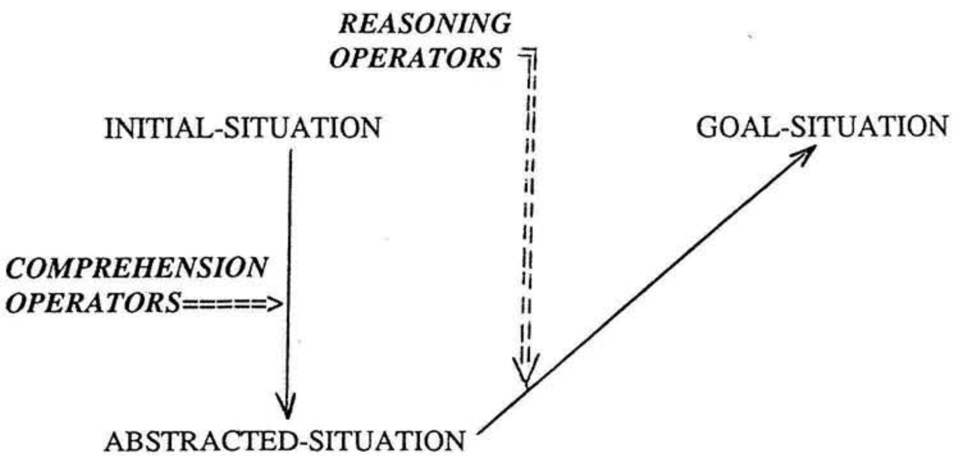
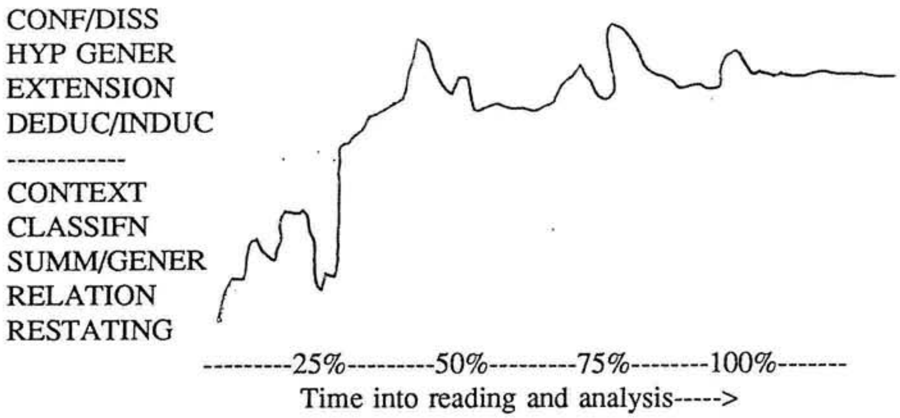
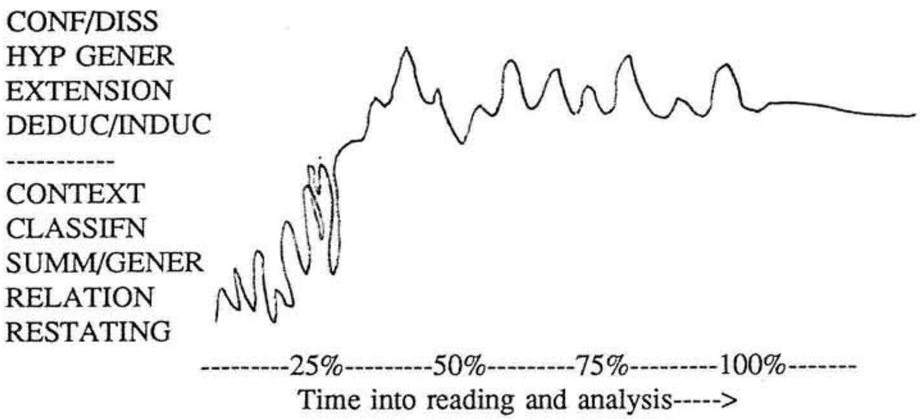


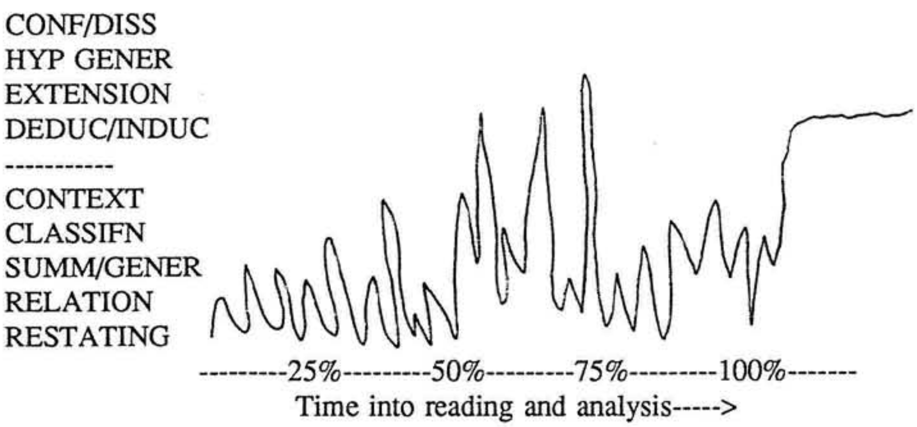
FIGURE 2: **Case Analysis as Comprehension and Reasoning Process.**



(i) QUANTITATIVE ACCOUNTING EXPERTS



(ii) QUALITATIVE ACCOUNTING EXPERTS



(iii) STUDENT ANALYSTS

<u>FIGURE 3:</u> **Schematic Representation Of Retelling Profiles .**

Table 1 a
TAXONOMY OF READING ACTIVITIES
(Adapted from Harste and Burke, 1978)

1) RESTATING
2) STATING A RELATIONSHIP
3) SUMMARIZING / GENERALIZING
4) CLASSIFICATION
5) CONTEXTUALIZATION / JUDGEMENT
6) EXTENSION
7) CONFIRMATION / DISSONANCE

Table 1 b
ADDITIONS TO READING INVENTORY
(Based on protocol coding requirements]

8) GENERATION OF HYPOTHESES
9) DEDUCTION/INDUCTION

Table 2

READING ACTIVITY	COGNITIVE BEHAVIORS
I. Comprehension Related Activities	
1). RESTATING	The text is restated using his own words. Subject considers this important, or does not understand the authors' language.
2). STATING A RELATIONSHIP	Discovering a relationship that joins two propositions in the text, not explicitly joined by the author.
3). SUMMARIZING/ GENERALIZING	An attempt to organize data which crosses multiple propositions in the text. Results in abstraction and reduction of information overload.
4). CLASSIFICATION	Involves placing a new proposition in a data category, relative to case information already encountered.
5).CONTEXTUALIZN/ JUDGEMENT	Involves making sense of an already known proposition in light of new facts.
II. Reasoning Related Activities	
6). EXTENSION	States a *new* proposition seen as relevant extensions of the text by applying past lessons and experiences.
7). GENERATION OF HYPOTHESES	Involves *extrapolating* from a set of already read facts of the text by applying concepts taught in theory.
8). CONFIRMATION/ DISSONANCE	Statements that demonstrate the reader is still engaged in search of cognitive meaning. Can relate to explicit facts read from the case, or to extensions and generations from explicit text.
9). DEDUCTION/ INDUCTION	*Inferred* statements that manifest as chains of propositional hypotheses by applying causal or correlational relations derived from theory or experiential heuristic.

TABLE 3: ANNOTATED EXCERPTS FROM AN EXPERT PROTOCOL

TIME INTO ANALYSIS (%)	READING PROTOCOL (Text in all capitals represents an activity; remaining is verbatim case text being real aloud)	ACTIVITY CODING
0	....announced the highest sales in company history, lowest aftertax profits (as a percentage of sales) in many decades, and the retirement of its long-tenured president and chief-executive officer, Jerome Adams. ** SO PROFITS GOING DOWN INSPITE OF SALES GOING UP**	RESTATING
5	.....founded in 1848, the Adams Company had long been identified as a family firm both in name and operating philosophy. ** AH-HAH! LARGE FAMILY RUN ORGANIZATION, DOING WELL SO FAR. THEY'RE GETTING INTO OPERATING TROUBLE NOW **	SUMMARIZING / GENERALIZING
16	.....In 1980 all branches of the family owned or influenced less than one fifth of the outstanding shares of Adams. ** OH, SO FAMILY RUN WAS A THING OF THE PAST, NOW THEY CONTROL ONLY 20%	CONTEXTUALIZING
25	.....Adams led the industry in the development of unique processes that produced a quality product at low cost and it paid off for a long time. ** RIGHT. ORIGINALLY, DURING THEIR FAMILY RUN ERA THEY DID VERY WELL. **	STATING A RELATIONSHIP
30	.....But all that has changed in the past 20 years. Our three major competitors have outdistanced us in net profits and aggressiveness. ** BECAUSE OF THEIR FAMILY ETHOS AGGRESSIVE COMPETITIVENESS DOES NOT COME NATURALLY TO THEM**	EXTENSION
35	.....Our gross sales have increased to over $1 billion...net profits dropped....consumer action group designated us "best value".....we have fallen behind in marketing techniques, our packaging is just out of date. ** PROBLEM IS THE ENTRENCHED FAMILY SENSE. FAMILY RUN BUSINESSES GET MISMATCHED TO TODAY'S PROFESSIONAL MANAGEMENT **	GENERATION OF HYPOTHESES
40	....salespeople were on straight salary with an expense reimbursement plan, which resulted in compensation under industry averages. ** UH-HUH. TYPICAL OF FAMILY BUSINESSES. THERE'S NO SUCH THING AS AN AGGRESSIVE SALESMAN IF HE IS PAID BELOW INDUSTRY AVERAGES. IT PROBABLY WORKED IN THE FAMILY DAYS, LIKE IN THE JAPANESE CULTURE EVEN TODAY. BUT... **	DEDUCTION / INDUCTION
....		

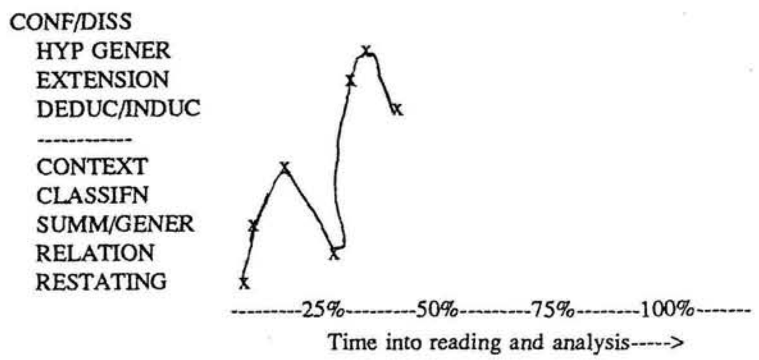
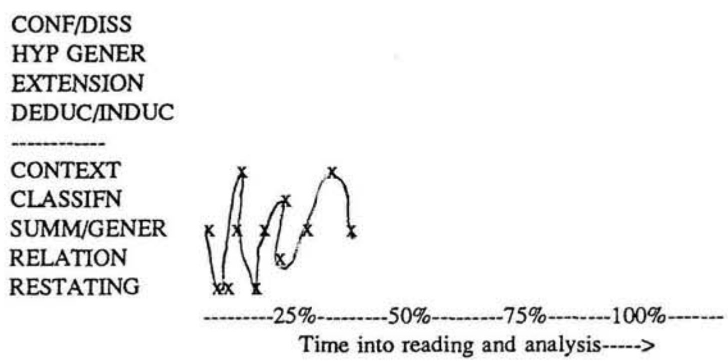


TABLE 4: ANNOTATED EXCERPTS FROM A STUDENT PROTOCOL

TIME INTO ANALYSIS (%)	READING PROTOCOL (Text in all capitals represents an activity; remaining is verbatim case text being real aloud)	ACTIVITY CODING
0	....announced the highest sales in the company's history, lowest aftertax profits (as a percentage of sales) in many decades, and the retirement of its long-tenured chief executive officer.....** THERE IS A FUNDAMENTAL CHANGE IN THE ENVIRONMENT OF THIS COMPANY. LOW PROFITS, HIGHEST SALES, RETIREMENT....ALL ARE SUSPECT **	SUMMARIZING / GENERALIZING
5	....Holy Bible and the concept of family stewardship provided all guidelines needed to lead his company. ** INTERESTING . HOLY BIBLE **	RESTATING
7	....goodness of mankind, power of fair play, and importance of personal and corporate integrity were his trademarks. ** THOSE ARE TRADITIONS OF THE SIXTIES**	RESTATING
	** ANYTIME A FAMILY OR SENIOR MEMBER LEAVES AN ORGANIZATION, I'M WORRIED THAT IT IS TROUBLE**	JUDGEMENT
	** I GOT TO GET AN IDEA OF THE DATES HERE. IS IT THE SIXTIES HERE? COMPANY FOUNDED IN 1848. TODAY IS 87. SO WHAT'S THE GRANDFATHER INVOLVED IN THIS? IS THE GRANDFATHER JEROME ADAMS? UH, I'LL FIGURE IT OUT LATER.**	SUMMARIZING / GENERALIZING
12	.....all branches of the family owned or influenced less than one-fifth of the out-standing shares. ** ONE-FIFTH. HM... STILL ENOUGH TO RUN THE COMPANY.**	RESTATING
15	.....of quality, brand-name consumer products for the American, Canadian, European markets. ** WELL, HERE WE FINALLY GET TO FIND OUT THE TYPE OF PRODUCT. QUALITY BRAND NAME CONSUMER PRODUCTS. WHAT DOES THAT MEAN? CONSUMER PRODUCTS, WHATEVER THEY ARE**	SUMMARIZING / GENERALIZING
20	.....sold by a company sales force in thousands of retail outlets..** SO WHAT ARE WE LOOKING AT HERE. SNEAKERS. HM...HM..WHATEVER **	CLASSIFICATION
25	...always been production-oriented and volume-oriented and it paid off for a long time. ** OK. THAT'S NICE. I GUESS COMPETITION GOT STIFFER AND THAT EXPLAINS THEIR PROFITS DOWN. **	STATING A RELATIONSHIP
28	....Our strategy was to make a quality product, distribute it, and sell it cheap. ** OK. OBVIOUSLY THEY ARE NOT A REGIONAL COMPANY. SALES OFFICES ALL OVER. **	SUMMARIZING / GENERALIZING
35	...all salespeople were on straight salary with an expense reimbursement plan, which resulted in compensation under industry average. ** I'VE NEVER KNOWN A SALESMAN..A GOOD SALESMAN WHO WOULD WORK ON STRAIGHT SALARIES. SO WHY AREN'T THEY PAYING THEM COMMISSIONS? **	JUDGEMENT
	...** OK. CORPORATE STRUCTURE SEEMS ADEQUATE. **	SUMMARIZING
....		



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