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REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: 114-ONR
2. GOVT ACCESSION NO.:
3. RECIPIENT'S CATALOG NUMBER:
4. TITLE (and Subtitle): Reading Under the Influence of Decision Making
5. TYPE OF REPORT & PERIOD COVERED: Technical Report
6. PERFORMING ORG. REPORT NUMBER: ONR
7. AUTHOR(s): Steven Antos, Lyle E. Bourne, Jr.
8. CONTRACT OR GRANT NUMBER(s): N00014-78-C-0433
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Institute of Cognitive Science, University of Colorado, Campus Box 345, Boulder, CO 80309
10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: NR-157-422
11. CONTROLLING OFFICE NAME AND ADDRESS: Personnel & Training Research Center, ONR, Code 458, Arlington, VA 22217
12. REPORT DATE: April, 1982
13. NUMBER OF PAGES: 30
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office):
15. SECURITY CLASS. (of this report): Unclassified
15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:
16. DISTRIBUTION STATEMENT (of this Report):
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report):
18. SUPPLEMENTARY NOTES:
19. KEY WORDS (Continue on reverse side if necessary and identify by block number): Decision making, reading, information analysis, incidental memory, depth of processing, schema, conflict resolution.
20. ABSTRACT (Continue on reverse side if necessary and identify by block number):

Two experiments investigated how potent decision relevant information in texts affects subsequent processing of that text. University freshmen and sophomores read texts consisting of a series of facts relevant to the worth of stock in a fictitious company. In Experiment 1, fact texts were read for the explicit purpose of making a decision to purchase or not purchase stock in the company. When the potent information occurred in the middle of the text it resulted in better incidental memory for facts that were opposite to the potent facts in

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valence. Controls demonstrated that the better memory must have been linked to deeper processing during input as opposed to a retrieval phenomenon. Experiment 2 demonstrated that the differential processing does not occur when subjects read the text without the intention of making a decision. The results were discussed in terms of how reading for the purpose of making decisions causes readers to develop a specified schema for conflict resolution. In this model, facts that conflict with preliminary decisions are processed more thoroughly and are thus more memorable.

Reading Under the Influence of Decision Making

Abstract

Two experiments investigated how potent decision relevant information in texts affects subsequent processing of that text. University freshmen and sophomores read texts consisting of a series of facts relevant to the worth of stock in a fictitious company. In Experiment 1, fact texts were read for the explicit purpose of making a decision to purchase or not purchase stock in the company. When the potent information occurred in the middle of the text it resulted in better incidental memory for facts that were opposite to the potent facts in valence. Controls demonstrated that the better memory must have been linked to deeper processing during input as opposed to a retrieval phenomenon. Experiment 2 demonstrated that the differential processing does not occur when subjects read the text without the intention of making a decision. The results were discussed in terms of how reading for the purpose of decision making causes readers to develop a specified schema for conflict resolution. In this model, facts that conflict with preliminary decisions are processed more thoroughly and are thus more memorable.

Reading Under the Influence of Decision Making

Important real life decisions are often partly or wholly based on information acquired by reading. Moreover, the amount of information found in a text containing decision-relevant facts is typically more than can be kept in mind at any one time. Indeed, a major problem with comprehension and the mental representation of text is the limited capacity of the reader to process fully all aspects of the text. Many of the rules for text representation developed in Kintsch and van Dijk (1978) and others are concerned with how information overload is controlled. Fundamentally, Kintsch and van Dijk suggest that a higher level thematic understanding of the text remains after a set of macro rules under schema control are applied to more local representations of text propositions. When properly executed, this system should result in a thematic understanding that is a compromise between the extreme of representing all information and the limits of human processing capacity. Of tantamount importance is that this resultant understanding preserve the essential meaning of the text. What is essential in a text is to a large extent a function of what the reader's purpose is in reading the text. Consequently, a good understanding of the reader's purpose can provide insight into how information overload would likely be dealt with and how the reader finally understands the text.

One common purpose for reading is to make a decision. Decisions often have a two-valued range (i.e., GO/NO GO). Often facts in a text can be categorized into facts pointing to a "Go" decision and those pointing to a "No Go" decision. Furthermore, each fact can be assumed to have some degree of evaluative valence or polarity. Presumably, the reader should take into account both the number and degree of valence of all facts in making a decision. Reading under the

influence of a decision goal should have its own relevant procedures for dealing with information overload.

Kintsch and van Dijk (1978) suggest that there are two good cases where reader's goals are clear enough to allow adequate scrutiny of macro operations. One is where the text structure interacting with convention dictates the goals, (e.g., a recipe being comprehended in order to prepare food). Another is when text is read for a special purpose, such as problem solving (Hayes, Waterman, & Robinson, 1977). In the present study, both these factors play a role. Both the structure of the text and the fact that a decision has to be made should provide a well-defined goal that influences text analysis. We assume that the reader/decision maker's prexisting knowledge will control how the text is represented. For example, if a stock broker knows that an important determinant in deciding to buy a particular stock is the company's growth potential, that broker pays particular attention to information in the growth category when reading fact sheets. It is also likely that information gained from the text itself may act in the same way as information brought to the text. Figure 1 displays a schematic of what is being suggested. Permanent conceptualizations (e.g., categorical information), relevant procedures, plus the intent or purpose to read in order to make a decision, combine to form a decision-based control schema. This control schema guides the processing of the text, but as new information is gained from this text, adjustments are made to the control schema.

Insert Figure 1 about here

Suppose, for example, a decision maker encounters a fact that is extremely salient in the sense that it has a high degree of valence (either pointing strongly to a negative or to a positive decision). Will this especially potent

information have any significant effect on the processing and/or memory of subsequent to-be-read facts. Two clear alternatives are possible: The reader could favor and process more deeply those facts whose valences are consistent with the potent information; alternatively the reader/decision maker could more deeply process those facts that are inconsistent with the highly polar information. The assumption is that very potent information will have a large effect on structuring the schema. It is possible that any effects produced by the potent information may be only on the input side. That is, only facts that are read following the potent information would be affected. But it is also possible that there are (retroactive) memory effects such that even those facts read prior to the potent information can be affected by it.

In order to study these possibilities, we asked subjects to read texts in which either the first, middle, or last pieces of information were potent. If the effect is on the input side, only fact processing subsequent to the potent information should be affected. If schema adjustments due to potent information are made retroactively, then retrieval of facts occurring prior to the potent information will be affected.

Experiment 1

Method

Subjects. Subjects were 87 undergraduate college students participating for credit in a psychology course. They were run in small groups of five to seven at a time. Twenty-three of the subjects formed the potent information first group (Group F), 24 subjects formed the potent information last group (Group L), and 40 subjects formed a group that got the potent information in the middle of the text (Group M).

Materials. Two statements were selected from each of the following six stock market information categories: Sales, Earnings, Capitalization, Dividends, Growth, General Factors. One of the selected statements was positive

and one negative. Positive statements reflected positively on the worth of stock in the fictitious company, ECTEX; they support a decision to "buy" rather than to "not buy" the stock. Negative statements reflected negatively on the worth of stock in ECTEX and thus support a "not buy" rather than a "buy" decision.

All of the statements used were taken verbatim or with slight changes from the pool of stock market statements developed and reported in Kozminsky, Bourne, and Kintsch (1979, 1980). Kozminsky, et al., presented data which indicated how reliably subjects could categorize a given statement and how positive or negative they felt the statement was. Valence judgments were measured using a five point rating scale, larger numbers indicating positivity. Only those statements that were correctly categorized more than 80% of the time (according to Kozminsky, et al., 1979, 1980) were considered for use in the present study. Also, statements selected for the present study had an average of approximately 2 (for negative statements) or 4 (for positive statements). In addition to the six positive and six negative statements selected from Kozminsky, et al., four additional statements were generated. Two of these statements were positive-potent and two were negative-potent. The statements contained extreme sorts of information. The two sentences in each set were related, that is, the second statement referred in some manner to the first, both in the positive and negative set. Because of this referential overlap the sentence order for this potent information was fixed. Each statement used in the present study was such that the information it contained was not inconsistent with information contained in other statements.

Examples of potent and non-potent statements can be seen in Table 1. The two non-potent statements are the positive and negative facts that represented the Sales category. The potent facts are not purposefully representative of any

one information category, but were prepared to be either very positive or very negative to readers.

Insert Table 1 about here

Design. The text for all subjects contained the same 12 basic evaluative statements (6 positive and 6 negative). Approximately half of the subject's texts had the set of two positively potent evaluative statements (PS) and half had negatively potent evaluative statements (NS). Group F read potent information presented as the first information in the text, Group L read it positioned last, and Group M read it in the middle.

Texts used for group M can be divided into statements before the potent information (B) and statements after the potent information (A). For each subject, B statements included one for each of the six information categories. If set B contained a positive statement about Sales then set A contained a negative statement about Sales. There were 3 positive and 3 negative statements in each set. Statements within a text alternated with respect to valence. The weak evaluative or non-potent text information started with a positive statement for half the subjects and with a negative statement for the other half. Also, across texts, a given statement occurred an equal number of times in the B and the A sets.

Procedure. Prior to reading the texts, subjects were given some background information. They were told that they were to act as stock brokers reading a fact sheet in order to make a decision to buy or not buy stock in the fictitious company, Ectex. Each of the six basic information categories was briefly explained and subjects were told that the information would fall into one of the six categories.

Texts were presented in booklets one statement per page, in order to force strict sequential processing. Subjects were instructed to read the statement on a given page, to think about its relevance to the decision, to mark a plus or minus sign on the page to indicate statement valence and to use a rating scale (1-6) to indicate how negative or positive they felt the statement was. The number "6" was used to indicate very positive, the number "1" was used to indicate very negative. After reading and marking each page, subjects wrote the word "buy" or the words "not buy" on a sheet of paper and then provided a few lines of justification for their decision. This task lasted about 15 minutes.

Following the decision phase subjects were given a new task, designed as an interpolated activity. They were asked to assume the role of a guest editorialist for their high school newspaper and to generate twelve good ideas in sentence form to go into an article that would be titled "After one year of college: The important differences between college and high school." This idea generation task took about 15 minutes.

Finally, subjects were given a surprise free recall task. They were asked to write down all the facts or parts of facts that they remembered from the stock market text they had read. Subjects were allowed to work until recall was exhausted. This free recall task lasted about 15-20 minutes.

Results and Discussion. Across all conditions, the percentage of judgmental responses consistent with the valence of the potent information was 83.0%. The percentage consistent for positive and negative potent information was 87.0% and 79.2% respectively. The percentage consistent responses for beginning and end-positioning of potent information was 82.6% and 83.3%. None of these differences was significant by Chi Square analysis. The average percent recalled of potent information was exactly the same for Group F and Group L, 78.3%. The averages for positive potent and negative potent were 79.5% and 77.1% respectively. The mean percent recalled of non-potent information was

47.1% and 47.5% Group F and Group L respectively. The mean percentage recalled of facts consistent with the potent information was 45.3% and for facts not consistent 49.3%. None of these differences were statistically reliable.

The potency manipulation produced differences in decision and memory. In general, subject's decisions were consistent with the valence of the potent information, regardless of whether that information was at the beginning or end of the text. Although there were slightly more decisions consistent with the potent information when that information was positive, this difference is not statistically significant. Any difference as a function of direction of polarity might be due either to differential degree of potency as a function of polarity or initial response bias.

The effect of potency is equally evident in the free recall data. A much greater proportion of potent as opposed to non-potent information was recalled. This effect was true for almost all subjects. With respect to the major point of the experiment the results are clear. There is no better recall of facts whose valence is consistent with the valence of the potent information. For example, "not buy" facts are recalled no better or worse than "buy" facts when the text contains very strong "not buy" information. Furthermore, there is no interaction of fact consistency and the position of the potent information in the input text.

A closer look at the data leads to an interesting interpretation of the "non-effects" found. A few subjects in Group F showed a strong effect for consistency. From this it was reasoned that possibly the potent information present at the beginning was not necessarily perceived as highly polar as intended. Because they were naive with respect to the stock market, subjects had no real criterion against which to judge the polarity of initial statements. Also, at the beginning of the text, the reader experiences no real information overload and on that account even potent statements might have little effect on

control processes. Putting the potent information in the middle allows a naiv subject to experience some more or less typical statements before reading the potent information. In this case, the reader might more fully experience the strength of the potent information relative to the non-potent facts. Also, by the middle of the text, the reader might experience information overload.

Group M also allows us to test a retrieval versus an input processing model. If the highly polar information affects only the recall of facts that come after it, then an input processing model is indicated. If recall of facts prior to the potent information is affected, then retrieval as well is indicated. It should be pointed out, however, that the data of Group L suggest that retrieval should not be affected.

In Group M, as in Groups F and L, subject's decisions were consistent with the valence of the potent information 78.6% of the time. Percent consistent responses when the valence was positive (i.e., "BUY" responses) was 85.7%, and when the potent information was negative (i.e., "NOT BUY" responses) 71.4%. The Chi Square statistic for this difference was 2.06, not significant.

The free recall data were partioned within subjects with respect to whether the item recalled came before (B) or after (A) the potent information, and with respect to whether the valence of the recalled item was consistent or not consistent with the valence of the potent information. Partitions between subjects were based on valence of potent information, order of basic statements, and whether non-potent statements began with a positive or a negative statement. All effects for order and valence of starting statement were not significant.

The average percent of basic (non-potent) facts recalled when the potent information was positive was 40.8% and 39.2% for the negative potent information condition. The direction of polarity of the potent information has no effect on total free recall, $F < 1$. Valence was also not significant for proportion of potent facts recalled, 75.0% for positive and 60.0% for negative.

The mean percentage recall of non-potent facts consistent with the valence of the potent information was 37.1%, and for inconsistent 42.9%, $F(1,38) = 2.4$. The interaction of position in text and consistency was significant, however, $F(1,38) = 4.3$, $p < .05$. A higher proportion of inconsistent than consistent facts was recalled for items following the potent information than for facts preceding the potent information. The mean proportion recall for facts prior to the potent information for consistent and inconsistent was 36.7% and 37.5% respectively. This difference was not significant in a special effects test using the pooled estimate for error, $F < 1$. For recall of facts following the potent information, the percentages for consistent and inconsistent were 32.5% and 53.3% respectively, $F(1,38) = 10.4$, $p < .01$. These data indicate that the ratio of inconsistent to consistent facts is about equal when considering those facts encountered prior to the potent information. However, when considering facts encountered after the potent information, that ratio is significantly greater than one. Subjects apparently more deeply process or better structure in their representation of the text information that follows and is not consistent with potent facts.

The assumption underlying this study is quite simple. The limited capacity of the reader leads him/her to the formation of rules (hypotheses) that function to choose which of many possible text representations should be constructed. Also, it is assumed that through some ongoing means-ends analysis, the purpose for reading characterizes the nature of these rules. Thus, reading for the purpose of making a decision should have its own special effects on how the text is represented. Briefly, it was thought that strong arguments for a particular decision could affect subsequent information analysis and representation.

In all groups, the potent facts in the text had a dramatic effect on the decision making. Also, those potent facts had a higher probability of recall than the non-potent facts. Even though potent facts affected decision making,

the potency manipulation did not have any significant effect on the processing of subsequent information in Group F. That is, putting the potent facts first as opposed to last in the text had relatively little if any effect on decision making or recall. After reviewing the data from Group F, it was reasoned that presenting the potent facts first may not have had much influence on processing subsequent facts for the following two reasons. First, since subjects were relative novices at the stock market and had not read any other facts, they did not understand the relative potency of these facts. Secondly, facts at the start of the text might not affect schema operation as much since information overload is not a factor at that point. The development of control processes is motivated by a limited capacity cognitive system and characterized by a means-ends analysis. Thus, real changes in these control processes would not occur until there was an information overload.

After several fairly complex facts, the reader should have both a sound basis for determining how polarized the potent information is and will also be experiencing some degree of information overload. The results of major interest in Group M are very clear. The direction of polarity of potent facts affected the processing and memory of subsequent facts. This finding is particularly strong because of the way control conditions were constructed. The ability to recall the exact same set of facts was controlled by their direction of polarity with respect to the potent facts and by whether the facts came prior to or after the potent facts.

The model currently used to account for these effects is shown in Figure 2. A fact is read and it is determined which decision the fact points to and how strongly it points to that decision. Secondly, it is determined if there is a current commitment to one decision over the other. If "no", the potential commitment to the fact-directed decision is incremented, and if the increment pushes the strength of the potential commitment beyond some criterion, an

implicit commitment is made. When a fact is read and there is a commitment, and that commitment is not consistent with the current fact valence, then conflict has to be resolved. It is the resolution of this conflict (deep processing) that causes a stronger representation of the inconsistent facts.

Insert Figure 2 about here

Experiment 2

The current processing model makes an important assumption. It assumes that some conflict or dissonance is necessary to motivate differential input processing and further, that the generation of such conflict will mainly occur when the text being read is comprehended for the purpose of making a decision. An obvious question is: What would happen if the same text were read for a purpose other than making a decision? If the decision-goal is the key element in explaining the processing effects found in Experiment 1, then there should be a lack of such effects if readers are given a different purpose for reading. Experiment 2 is a preliminary assessment of the effect that reading to make a decision has on comprehension processes.

Method

Subjects. Subjects were 40 undergraduate college students participating for credit in a psychology course. They were run in small groups as in Experiment 1. Half the subjects read texts with positive-potent information and half read texts with negative-potent information.

Design and Procedure. The texts used were identical to those used in Group M of Experiment 1. The procedure was identical to that used in the first experiment, requiring subjects to categorize and evaluate each fact statement, except for one detail. Subjects were not told that they would have to make a decision after reading. Instead, they were told that the experimenters were

collecting normative data on categorization and evaluation, to be used in some future experiment. Subjects read the texts without any intention to remember the material or to make a decision.

Results and Dicussion. The mean percent recalled for potent and non-potent facts was 63.8% and 36.5% respectively. For facts present in the text prior to the potent information, the percent recall of non-potent consistent and inconsistent facts was 34.2% and 39.2%. For facts presented following the potent information, the means were 31.7% and 40.8% respectively. The main effect of consistency approached statistical significance, $F(1,38) = 2.46$, $p = .121$. The interaction of position and consistency was unreliable, $F < 1$, as were all other main effects and interactions.

The results of this control experiment are predicted by the model depicted in Figure 2. Differential processing due to valence consistency of facts read after the potent information was not found when the goal of reading was for something other than to make a decision. According to the model discussed above, this "non-effect" is due essentially to the lack of conflict that would ordinarily be present when a reader attempts to develop an integrated representation of the text in order to make a decision.

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Kintsch, W., & van Dijk, T.A. Toward a model of text comprehension and production. Psychological Review, 1978, 85, 363-394.

Kozminsky, E., Kintsch, W., & Bourne, L.E., Jr. Decision making with texts: Information analysis and schema acquisition. Journal of Experimental Psychology: General, 1981, 110, 363-380.

Table 1

Non-Potent Facts:

Positive - Manufacturers of minicomputers in general have broken open new markets for Sales of digital processors (e.g., home computers) which should benefit ECTEX sales.

Negative - Some leading competitors have significantly lowered their price on hand-held calculators. This development should adversely affect ECTEX's sales.

Potent Facts:

Positive - A newly marketed computer-controlled solar collector device will net ECTEX 2.5 billion dollars more than any of its competitors over the next two years, and this large profit will be shared with stockholders by means of a large cash per share bonus in addition to regular dividends.

Negative - A high-risk large scale investment scheme to develop a new computer guidance system for short-range missles used by the military has completely failed. This will cause ECTEX to lose 2.5 billion dollars over the next two years.

Figure 1

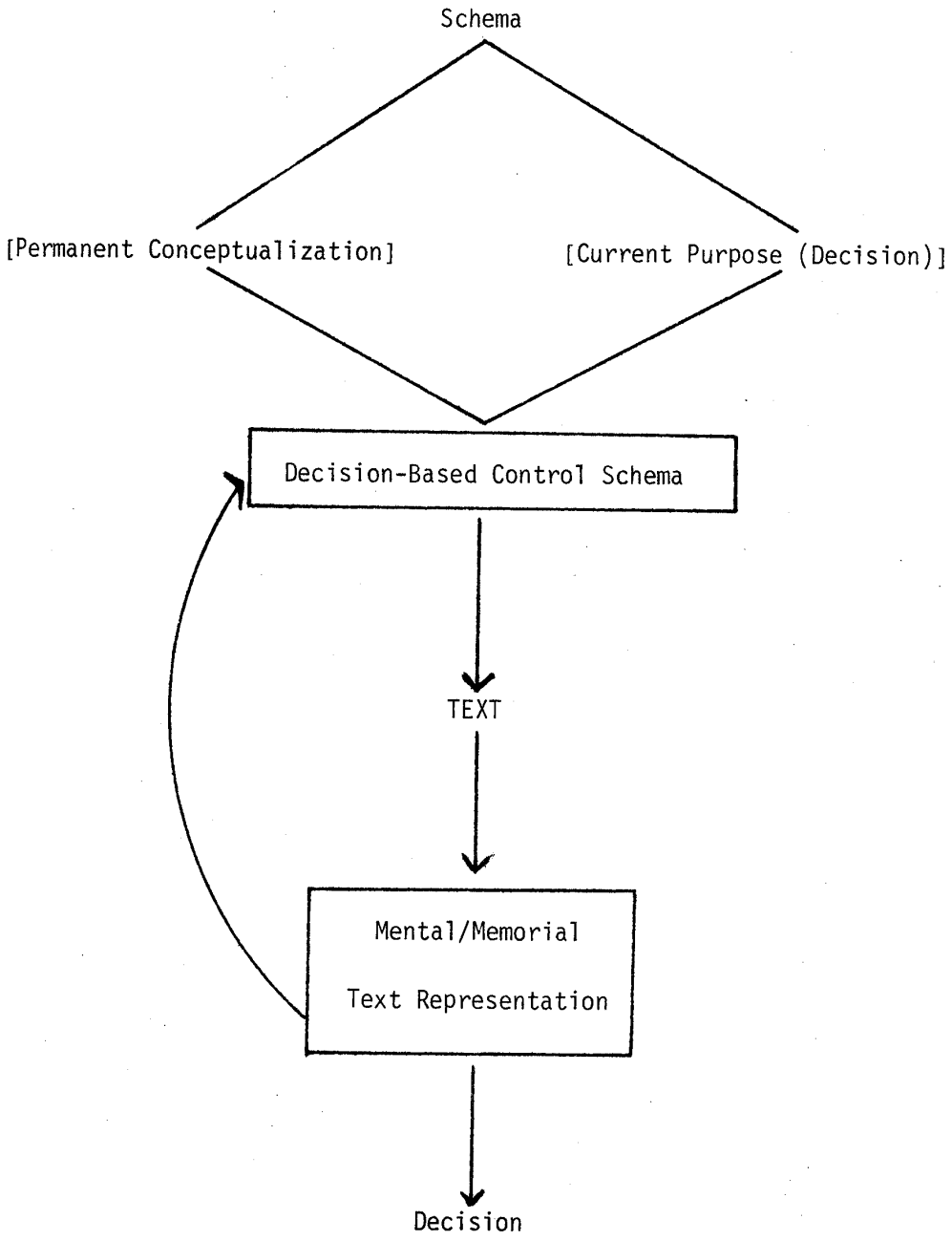
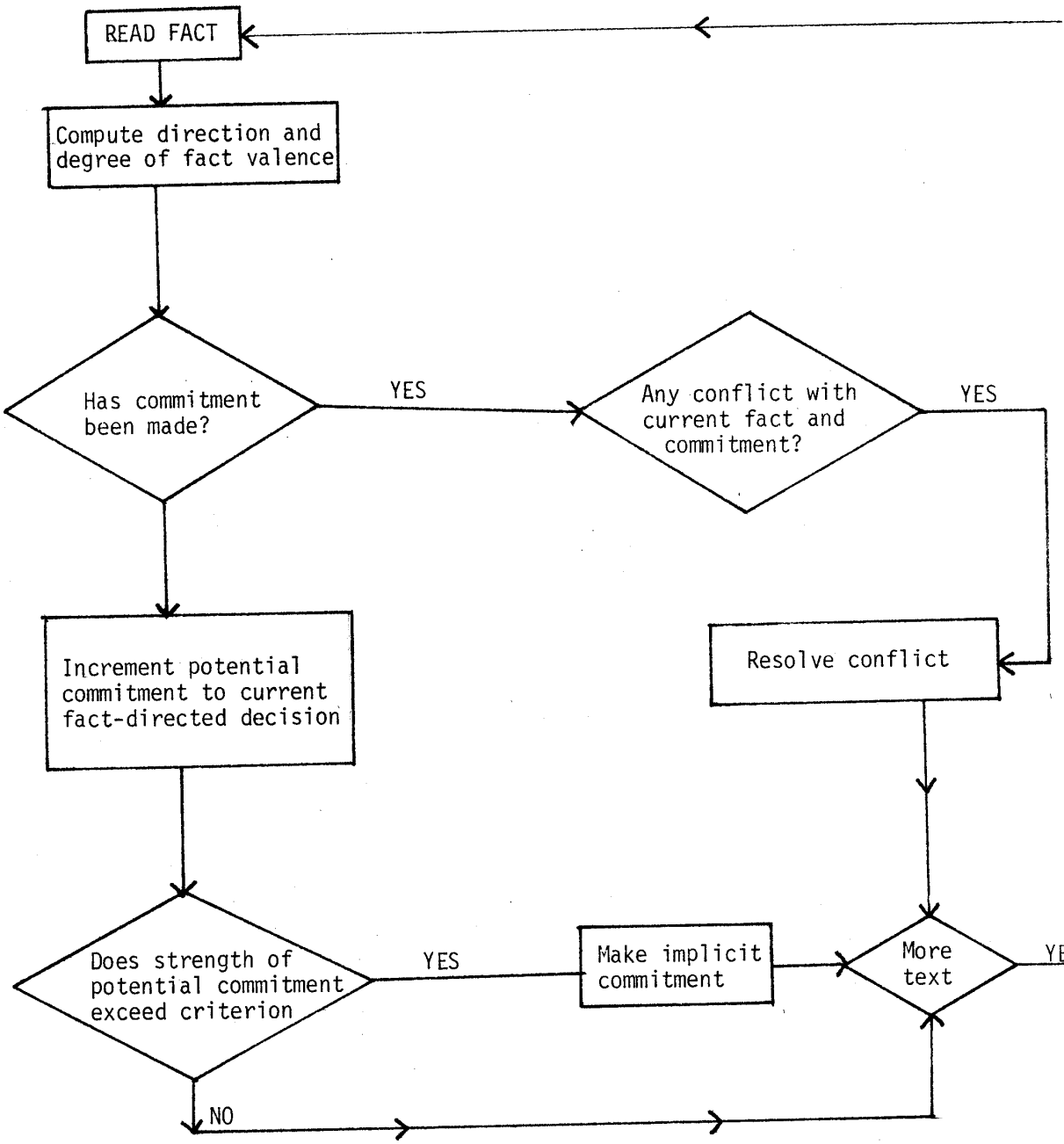

Schema
[Permanent Conceptualization]
[Current Purpose (Decision)]
Decision-Based Control Schema
TEXT
Mental/Memorial
Text Representation
Decision

Figure 2


READ FACT
Compute direction and degree of fact valence
Has commitment been made?
YES
Any conflict with current fact and commitment?
YES
Increment potential commitment to current fact-directed decision
Resolve conflict
Does strength of potential commitment exceed criterion
YES
Make implicit commitment
More text
YES
NO

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