TOP MANAGEMENT DECISION MAKING:
A FRAMEWORK BASED
ON THE STORY MODEL

by

A. J. de Koning*

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* PhD Candidate, at INSEAD, Boulevard de Constance, Fontainebleau 77305 Cedex, France.

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ABSTRACT

The paper argues that a framework can be built using the story and anchor-and-adjust models which integrates research in strategic decision making, particularly cognitive biases and maps, executive team decision making, and resource allocation and acquisition decision processes. Propositions are developed focusing on the managerial implications of the story model.

INTRODUCTION

Over the last two decades significant research in business policy has been conducted on top management decision making. The diverse findings of cognitive maps (e.g. Ginsberg, 1989), characteristics of decision making processes (e.g. Burgelman, 1983) and characteristics of top management group decision making (e.g. Bourgeois and Eisenhardt, 1987, 1988) have added considerable insight, yet the research lacks a framework for decision making which could tie these streams together, and yield further insights.

Decision sciences has developed numerous valuable models of decision making, looking particularly at biases in judgment. Most of these models do not fit the specific context of top management decision making, except in the most general sense, and therefore do not provide a useful framework. Rather, the argument of this paper is that we may use the story model (Pennington & Hastie, 1992) to understand top management decision making in contexts where all the information is presented, then decision categories are fixed, and finally a decision is made. In contrast, in cases where specific decision categories are known before collecting and processing the information, the anchor-and-adjust model should dominate, as predicted by previous research.

The story model developed by Pennington & Hastie in their research to understand juror and jury decision making, a decision making process which bears strong similarities to top management decision making. The basic argument is that individuals process information, while they are listening, by building a story or causal construct which
integrates the bits of information. As required the individuals make causal inferences to connect information, and ignore and even forget information that does not fit the story in process. This story, rather than the information presented, has a direct impact on the final decision. Thus the story model describes the way that cognitive assumptions connect to judgment.

Hogarth and Einhorn's (1992) anchor-and-adjust model is more generally known. They argued that people begin with an anchor, a prior position on a yes/no scale for the required decision. People then adjust their position on the decision scale as they process each new piece of information. Because the story model has not yet been applied to top management decision making, I will bias the discussion in this paper towards the story model.

Top management decision situations often resemble those of jury decisions, in particular those situations which involve major strategic decisions. For example, top management in diversified firms generally reserve the right to make major resource allocation decisions, particularly decisions to acquire and possibly merge other firms. Despite reserving the right to final decision making, top management is limited in the extent to which they can directly investigate and evaluate opportunities in any substantive degree (see for example, Bower & Doz, 1979). Top management must and does rely on the information gathering and presentation of opportunities done by corporate staff and middle management. In the presentation process, the information is processed and decision categories are finalised. It is within this context that the I will argue that top management decision processes can be illuminated by the story model.

The paper is organised in the following manner. The first section gives a brief description of the two decision making models, the story model and anchor-and-adjust model. The second section looks at top management roles in resource allocation and acquisition decision making, focusing on cognitive biases, cognitive maps, characteristics of executive team decision making, and acquisition decision processes. This discussion establishes the context for the third section, which defines the relevance and scope of the story model and develops propositions for strategic decision making in the third section. The focus is on decision making specific to the executive resource allocation decision context. The conclusion will suggest implications for managerial action and discusses other more general applications of causal inference concepts that might explain a wider set of phenomenon.

THE INFORMATION PROCESSING AND JUDGMENT MODELS

Out of the range of contributions to our understanding information processing and judgment, I believe that two models describe the type of decisions which we are investigating. These two are the story model and the anchor-and-adjust model. Relying on the results of previous research (Pennington & Hastie, 1992) and on the previously established scope conditions of other models, these two models of information processing show the clearest links with top management decision making. The models are
complementary, and have good explanatory power for judgment within two different information processing contexts.

The Story Model

The story model (Pennington & Hastie, 1986, 1988, 1990, 1992) applies to situations similar to the court room, where the model was originally developed. In the court room, relatively naive (in terms of the law and the specifics of the case) jurors sit through hours or days of evidence presentations. The evidence could be presented in various orders, and is presented in an advocacy structure with a prosecutor and the defense arguing the two sides of the case. Court case protocol prevents the witnesses from speculating on causal relations, but makes them focus on facts that are known. Causal speculation is provided by the lawyers. After all the evidence is presented, the judge tells the jury what judgment is required from them and specifies the causal inferences implicit in each judgment category. The jurors then withdraw to make a collective decision, selecting a mutually agreed upon judgment. Note that the judgment categories, which often are more complicated than simply 'guilty' or 'not guilty', are not known until the end of the case.

The story model describes the individual juror's decision-making process, arguing that the juror organises the evidence into a story structure which has an implicit judgment in the story line. When the juror learns the judgment categories, the juror looks for a goodness of fit between the story constructed and the judgment categories. Thus, understanding how the information is processed allows one to predict with reasonable accuracy what the judgment will be.

At the jury level, decision consensus can be achieved through discussion of the judgment or of the evidence. Pennington and Hastie observed that when the jury focused the discussion strictly on the judgment decision, jurors had low levels of mutual respect and confidence after the decision. In contrast, when the jury focused on discussing the evidence - i.e. integrating their stories - jurors had high levels of confidence in the others after the decision.

Pennington and Hastie's later research was specifically designed to explore how generalisable their findings were outside the courtroom, and experimental results suggest that they have a model which describes a wider set of phenomenon. The key scope conditions, thus, is that evidence is presented without detailed understanding of the judgment required, and that judgment categories are determined after evidence is presented. Judgment categories may be proposed by an outsider (the judge in the court or the manager in closing remarks of the proposal), or judgment options may be generated by the listener after hearing the information.

The Anchor and Adjust Model

The anchor-and-adjust model also describes an information-processing and judgment interaction (Hogarth & Einhorn, 1986, 1992). The anchor-and-adjust model was developed in management decision context, and has better explanatory power when the
judgment categories are well-known before the information or evidence is presented, and more particularly when judgment is requested continuously. As each piece of evidence is presented, the strength of current judgment decision is adjusted up or down - possibly even reversed - according to the nature of the evidence. The anchor-and-adjust model describes a process where evidence is processed according to the judgment required, and not according to the interconnections between the evidence. Judgment is not suspended until the evidence is all heard.

Later work by Hogarth & Einhorn explored precisely the interaction between when judgment is required, and how information is processed (Hogarth & Einhorn, 1992). In fact, their results point to the model developed by Pennington & Hastie, and anticipate the later experimental results.

Summary

Translating the details of the models and their scope conditions is a detailed task, and leads to specific propositions. The focus of the following discussion is the story model, using the development of the argument to demonstrate the potential of this model for strategic decision making research. First, in the next section we look at the resource allocation and acquisition decision process literature. Using the research streams of the Bower, Burgelman, Jemison and Haspelagh, a description of the role of top management in strategic decision making is developed. The section following integrates theoretical discussion and propositions with a review of research on the resource allocation and acquisition process.

REVIEW: APPLICATIONS OF DECISION MAKING THEORY TO STRATEGIC DECISION MAKING

As strategy research moved away from assumptions of rational choice, implicit in the strategic analysis literature, numerous researchers turned to behavioral decision theory and cognitive science to explore the role of the individual in firm strategy. Much of the research included theoretical developments, which developed but did not test propositions.

Decision making and cognition studies in strategy usually focused on the individual, although some attempted to extend the individual unit of analysis to the organisational level. Such attempts are fraught with difficulty, largely because the discipline bases of the theories did not develop the group level implications. Within management science, connecting the various levels of analysis from individual to group to firm to industry and finally to global frames is precisely an ongoing challenge. Two noteworthy attempts to link concepts of cognition across units of analysis are fairly recent (Schneider & Angelmar, 1993; Kogut & Zander, 1992), and more work needs to be done. Cyert & Williams (1993) note that work in linking issues of information and strategy must develop robust models to explain the complex link between individuals, organisations and strategy, particularly given the future expected increase in information.
Cognitive Biases

One research stream in strategy literature drew on the discoveries of cognitive biases in processing information, such as the memory availability bias, as well as judgment biases such as overconfidence and escalating commitment. These biases were identified largely within the research program initiated and developed by Tversky and Kahneman. The research also draws on work in psychology which identified emotional or psychological distortions of the rational process. In general, strategy researchers in this literature limit their contribution to careful evaluation of the theories, possibly with testable proposals for understanding managerial behaviour (see, for example Barnes, 1984; Duhaime & Schwenk, 1985; Ungson, Braunstein, & Hall, 1981). The emphasis in this type of research is identifying dysfunctional cognitive processes and suggesting how to correct the bias (Stubbart, 1989).

Another research stream has attempted to model strategic decision making, noting differences between what managers say they use as a basis of decision making, and what they actually decide. Like the above research stream, these researchers aimed at developing accurately descriptions of dysfunctional cognitive processes, with the implicit goal of suggesting corrective behaviour. One noteworthy example is the work in acquisition decision making by Stahl and Zimmerer (1984) which suggests that executives are not aware of the difference between their stated decision criteria and their actual choices. Using a linear programming model, they developed an experimental test of what evidence executives consider in their actual decision. The study is unfortunately limited because the information provided is exclusively financial ratios, and assumes that the industry and business context of the financial ratios is irrelevant. Perhaps a portfolio manager would buy and sell based on 20 financial measures (unlikely, but possible), but even the most diversified firm would likely conduct some due diligence analysis beyond financial ratios. Another interesting study focuses more on comparing actual behaviour with that prescribed by the literature on strategic decision making (Dutton, Walton, & Abrahamson, 1989).

Cognitive Maps

Cognitive maps research links individual, organisational, and even inter-organisational units of analysis and is promising. The underlying theory argues that people select, evaluate and use incoming information according to their cognitive maps. These researchers avoid the pejorative use of "bias", but rather they are essentially arguing for understanding information filters. Actions based on cognitive maps frequently have an enactment effect. That is, as Porac, Thomas and Baden-Fuller (1989) observed in the Scottish knitwear industry, the cognitive maps result in decisions and actions which reinforce the initial beliefs and assumptions of the cognitive map. Only major environmental change or individual creativity would interfere with this enactment process. The interesting aspect in this research is that individual cognitive maps are compared to other managers in the firm or industry (depending on the issue of interest), and "mean" cognitive maps can be developed. Research programs include studies of acquisitions (Ginsberg, 1989), industry (Porac, et al, 1989; Gronhaug & Falkenberg, 1989) and intra-firm dominant coalitions (Fahey & Narayanan, 1989).
Looking at the organisational level, Meyer (1984) proposes a model for how cognitive maps are coordinated to facilitate decision consensus in his comparison of instrumental versus symbolic modes of organisational decision making. The thesis is that using appropriate metaphors allows enough ambiguity at the group or organisational level of discussion to override the differences between stakeholders and their cognitive maps, and to form cohesion around a new concept.

As Stubbart (1989) points out, however, the main limitation of most of this research stream is that it rarely extends mapping beyond causal structures and thus is focused on linear and stationary relations which do not necessarily represent how managers actually think.

The cognitive maps research stream dovetails well with the research proposed in this paper. The anchor-and-adjust model (Einhorn and Hogarth) and the story model (Pennington & Hastie, as well as the generalised causal inference theory of van den Broek, 1990a, b), all link information processing with decision making and overall judgment ability.

Characteristics of Group Decision Making Processes

Within the strategy literature, Bourgeois and Eisenhardt (1987, 1988, 1989, 1990) have developed a series of studies on top management decision making. Their conclusions are framed in response to assumptions about decision making from rational choice theory. In particular, they observed that better decisions (as measured by firm performance) were made by top management firms that acted quickly, and contrary to previous assumptions the faster decisions used more information and more group discussion of that information, than slow decision making teams.

Bourgeois' earlier observation (1980) that high performance was associated with 'qualified consensus' was reinforced in the later studies. Qualified consensus, as described by Bourgeois, included full discussion of top managers' individual perspectives (i.e. full information sharing) while allowing the CEO or the executive directly responsible to make the final decision if consensus did not emerge. This qualification allowed the top management teams in high performance firms to act quickly, without losing time in decision deadlocks and also without losing the benefit of multiple perspectives. The benefit of multiple perspectives has been explored in research papers which show that diversity without sharing of perspectives does not enhance group performance (Crossan, Lane & Hildebrand, 1991; Kwun & Chakravarthy, 1993).

Acquisition Decision Making

Haspelagh and Jemison (1991) noted that the acquisition process is similar to the resource allocation process. If the company's process is robust, it will integrate the acquisition decision into the existing process, though possibly processing the decision at an accelerated rate. Despite their caveat regarding differences between firms regarding the quality of the resource allocation process, Haspelagh & Jemison noted some aspects of acquisition decisions which add to earlier research on resource allocation decisions, and
interesting for the purpose of this study. The key issues are the speed of decision making, the limited access to and processing of information, and the dissimilarity of these decisions from manager's regular experiences.

Haspelagh and Jemison (1991) describe the influence of the company's history on information processing and its affect on judgment. Top management may have limited knowledge of the new industry or business, and subconsciously rely on the experiences of the past without evaluating whether they are relevant to the new context. Thus, history becomes the basis for selecting what evidence is most salient and for making causal inferences. Also, firm incentives and context may result in a process of championing by middle management or staff to the extent of covering negative information, with a resulting strong advocacy for a particular judgment. This advocacy is strongly evocative of the court room, where opposing cases are presented, deliberately presenting a unitary perspective of the evidence in an attempt to influence the jury. In companies, however, this deliberate dialectical approach is uncommon, so excessive advocacy may hinder judgment quality.

Jemison and Sitkin emphasis the role of activity segmentation in the analysis stage, and the subsequent difficulty in integrating perspectives (1986, p. 149). The problem of integrating is exacerbated by the known functional biases of top management. Middle management and corporate staff will emphasis collection and presentation of preferred information types. Even if other relevant information is presented, it would probably carry less weight in the overall decision. The result of focusing on preferred information can help communication by providing a common language and 'grammar' in which to conduct discussion, which is valuable, but can also obscure or ignore relevant issues. This case research finding is supported by experiments conducted by Davis-Blake, Haunschild, Henderson & Jemison (1992), who found strong biases in how managers dealt with intractable issues, but no significant differences in tractable - typically financial and accounting - issues.

When less valued information is presented, we can assume that the manager comes from a relatively less valued functional area. Psychological theory of in-groups (Salancik & Pfeffer, 1978) and network theory of structural holes (Burt, 1992) suggest that this person would be 'discounted' in terms of status, and would be given less credibility than some one from the favoured functional perspectives, unless the unusual perspective or person is specifically 'sponsored' by a dominant group member. In the momentum of acquisition decision making, we can expect that the process of integrating new perspectives and sponsoring new potentially important information would be unlikely. Thus, the historical biases of the top management's information and decision process, as indicated in the control and resource allocation systems, would most likely be magnified in the acquisition process.

The very fragmentation of the process of acquisition analysis suggests that top management must and does play a key information-integrating role. In the final analysis, it is the executives who make the decision whether or not to acquire, and whether or not to integrate or merge the acquisition. Thus the biases and cognitive maps of the top managers, not just their personal motivation, is important. The story model suggests that
their experience and expertise will have a fundamental impact on the types and strength of causal inferences made, as well as the valuation of the evidence.

**A NEW FRAMEWORK FOR RESEARCHING STRATEGIC DECISION MAKING: A SERIES OF PROPOSITIONS**

This next section develops propositions for experimental and case research which consider the implications of integrating the insights of the two preceding sections. Strategic decision making within firms can be viewed from the perspective of top management resource allocation process, as described by Bower, Burgelman, Haspelagh and Jemison within various specific contexts. In these processes, top managers usually sit as judge and jury, making decisions in response to proposals prepared and presented by others. As noted above, the bulk of the following discussion focuses on demonstrating the relevance of the story model to this field.

**Defining Scope Conditions of the Model**

The resource allocation or acquisition decision making has clear parallels with the juror task, suggesting use of causal structures to organise and interpret vast amounts of tractable and intractable information. There are some significant differences, however, between the legal and business context. First, unlike jurors, in managerial decision making one expects a minimal level of expertise and experience relevant to the decision required. Thus, the model should be shown to describe non-naive decision makers. Second, information is not always presented in structured and focused context, unlike court trials. If the causal inference is indeed happening, some of the impact on the decision making process will be through information seeking to confirm causal inferences, as described by Porac et al's study (1989) of cognitive maps in the knitwear industry. Third, the decision process rarely contains clearly defined solution categories, even after all the information is collected and evaluated. In broad outlines, we expect a yes/no decision, not unlike the guilty/not guilty verdict. But the subtleties of the executives' yes/no emerge when the decision has multiple dimensions, as for example in an acquisition decision combined with valuation and merger decisions, generating more interrelated decision categories. Thus, the decision categories may be generated as part of the information processing stage, and not set by an external agent such as the judge.

Despite the caveats, I would expect this result to hold, even when the final decision is quite complex, because the essential need to organise diverse and even divergent information is similar for both the juror and the manager. We can argue that an executive evaluating proposals or evaluating acquisitions must rely on many sources for fragmented and incomplete information, and must build enough coherence from the information to generate a decision. If the decision categories are not specified a priori, then the story model will describe the process of integrating information used by the executive.
Proposition 1: When making strategic decisions which are not specified in detail a priori, managers use causal inferences as described by the story model to process information. This story selectively organises information into a coherent causal structure.

The specific nature of the decision context defines the scope conditions which predict whether the story model or anchor-and-adjust model will dominate, as Pennington and Hastie established (Pennington & Hastie, 1992). Taking for an example the resource allocation decision context described by Bower, we can differentiate between two roles, and two styles of information processing. Top management typically hears the information and makes the decision in an executive meeting context. This meeting meets many of the criteria of story model scope condition. In contrast, middle management must make judgment about the value of a proposal, while at the same time receiving more and more information. In the preparation process, the middle management helps lower management to collect and shape a case for the desired proposal. The middle manager has his/her reputation for good judgment on the line, thus continuously evaluating the merit of the project, while at the same time becoming a champion for the project. The mixed roles naturally lead to real time evidence evaluation, although research suggests that escalating commitment can reduce the judgment role substantially. In the early stages, however, before top management hears of the project, the middle manager is evaluating information on-line while deciding to push the project up the ranks. Thus we can conclude that middle management's judgment context is more likely described by the anchor-and-adjust model.

Proposition 1a: The story model describes situations in which judgment is deferred until all information is heard and evaluated, such as resource allocation and acquisition decisions by top management.

Proposition 1b: The anchor-and-adjust model describes situations in which judgment is continuous, throughout the process of hearing and evaluating information, such as middle management in preparation of strategic proposals.

Impact of Information Order

Pennington and Hastie found the impact of information order on story construction is significant. Managers may or may not be able to control the flow of information they confront. If faced with an acquisition opportunity, would a systematic search through lists of financial, production, marketing and organisational issues lead to different decisions than a complex story integrating all these tractable and intractable issues? Following the jury research results, we can expect two situations in which the information order would have an impact. One, the original decision-making team or managers could be affected in the initial information processing stage, thus affecting the recommended decision of the team. Two, in presenting the recommendation to peers or the executive committee, project champions could order the information in such a way as to ease of construction of a favourable story, thus swaying the decision.

Proposition 2: Because the order in which information is processed affects how and what causal inferences are made, the easiest story to construct will dominate managers' decision making.
False recognition of 'facts'

Experiments testing memory availability effects found a significant rate of 'false alarm' recognition of information. Pennington and Hastie (1992) found that people remember the presented evidence well, regardless of which judgment they selected, but they falsely remembered evidence which was not presented but which they inferred to fill the gaps in their causal story. A similar test by Van den Broek (1990a) found that after a time delay, people also forget more information outside the causal structure. We can expect the same effects among managers making inferences to connect incomplete and fragmented information. Inference, filling in the information gaps, and other story building techniques use general and/or tacit knowledge of facts and causal relations. Presumably these story building materials would be stronger or more extensive in the experienced manager, and thus we can expect that these managers should display higher rates recognition of false 'facts'. In all cases, we can expect that managers will forget more information not used in their causal story.

Proposition 3a: Where causal inferences are strong, the story model predicts that managers will falsely recognise their inferences as information.

Proposition 3b: Experienced managers will make stronger causal inferences, and thus show more false recognition of information.

Proposition 3c: In delayed recognition tests, managers will forget more information that is not used in their story structure.

Impact of Similar Cognitive Maps

The role of experience and knowledge should also affect decisions systematically, as some managers tend to have similar cognitive maps. Pennington and Hastie (1988) were able to demonstrate a social class effect in types of causal inferences made based on the same information. The result was probably due to the degree of likelihood the subjects knew of a situation or person as described in the case. In the managerial context, similar causal inferences may be due to similar cognitive maps developed through education, functional or industry experience, or perhaps more general cultural effects. Cyert & March (1963), Henderson, Davis-Blake, Jemison & Haunschild (1992) and Hedlund (1994, unpublished results), among others, have demonstrated strong functional biases in problem and solution framing. If the mechanism through which those biases enter decision making is through the causal inference process, systemic biases in either decisions or in core story episodes should be apparent.

Two levels of effects can be expected. One, managers from different groups could make different decisions. If the differences in stories of various classes of managers are reflected in decisions, we should see significant differences in the rates of decision choices. Two, if final decisions do not significantly differ, but individual stories do, then we can expect the differences in cognitive maps to show in the relative richness of the causal network, or in the story elements used, as well as differences in what general or tacit knowledge is used to make the necessary inferences. The main story line is arguably based on the strongest causal connections, and thus uses the least amount of general knowledge, allowing for the highest amount of inter-subject agreement within a decision category.
Thus, differences in stories among managers who agree on a decision also are potentially interesting.

Proposition 4a: For a given decision, managers from different functions will take different decisions, holding other factors constant.
Proposition 4b: Within a decision category, managers from different functions will make different causal inferences, holding other factors constant.

**Decision Confidence**

Pennington and Hastie (1988) found that jurors' confidence in their decisions increased if they were able to build a coherent story from the evidence. When jurors were able to build more than one story and reject the extra stories, decision confidence increased further - a counter-intuitive result. Confidence, or commitment to strategy, has been demonstrated in the organisational change literature as an important factor in successful change. If managers can build a coherent causal structure from the available information, then managers' decision confidence is presumably based on their belief that their own knowledge and the information available are sufficient to allow informed decision making. The value of constructing multiple stories suggests that as more people and their stories are used to process the available information, decision makers have more commitment to their final judgment. Bourgeois' (1980) description of qualified consensus among high performance executive teams shows high information sharing and discussion of implications, which is followed by the decision making executive making the final choice. The quality of the decision, and the level of mutual decision confidence, can be explained by the rich and multiple causal structures generated in the discussion. Eisenhardt's later work (1989, 1990) on fast decision making also suggests that the same process of multiple story generation is combined with high decision confidence.

Proposition 5a: Decision making managers' confidence in their decisions will increase when a coherent story construction is used to process information.
Proposition 5b: Confidence in decisions will be higher when alternative story or causal constructions can be built and rejected.

**Credibility of Informants**

Credibility information, as tested in juror research, may not be directly relevant to the strategic decision making process, but the credibility of informants is taken into account within companies. Pennington and Hastie (1992) found that presenting information in story structure enhanced the impact of positive or negative information about the credibility of witnesses. Thus, witnesses of low credibility had the most positive impact on jurors' judgments when they presented evidence in order of issues, rather than the causal structure of a story. High credibility witnesses, on the other hand, had more impact presenting evidence in a story flow. In managerial research, Burt's research (1992) on managerial networks demonstrates the importance of credibility in exercising influence on decision making, and looks at how managers gain credibility within their company. Likewise, Jemison and Sitkin (1986) found that some information is undervalued in acquisition processes, which may be due to managerial or functional credibility problems within the
particular firm's history. Given the importance of managerial credibility, we can expect that the structure and order in which the information is presented will be significant. For example, a manager who lacks credibility within a company and who proposes a strategic initiative in story form, may have her perspective highly discounted due to magnified credibility effects.

Proposition 6: Decision-making managers, if they receive information in story logic, will make more extreme judgments - positive or negative - of the credibility of the information from the informant managers.

Post-decision Mutual Respect among Decision Makers

On the group decision making side, Pennington and Hastie's (Pennington & Hastie, 1990) results on post-decision confidence of the group peers are particularly appropriate in a business context. They found that juries which spent their discussion time focusing on their stories and their understanding of the evidence had greater respect for other each other, after the judgment, than juries who focused discussion immediately on the decisions. As evidence was discussed, individual jurors would have their interpretation and memory of the evidence challenged, and possibly changed. Evidence-focused discussion presumably lead to a shared story, which allow for easier group selection of a decision using the same goodness-of-fit criteria that jurors used individually. Decision-focused discussion would be less likely to affect individual story constructions, and thus some jurors would be less confident of the group consensus because the decision would not meet the best-fit criteria.

Bourgeois and Eisenhardt's comparative work on the effectiveness of executive team decision making, and top management politics suggests similar processes at work. Effective executive teams focused on full discussion of information and each individual felt free to openly discuss their interpretation of the information. Effective teams members expressed confidence in other executives' decisions, even when the final decision taken was against their personal preference. Less effective teams members not only reported strong feelings for and against other executives, but also showed attempts to acheive consensus through focusing discussions on decisions. Eisenhardt and Bourgeois (1988) also found that effective teams based decisions on more information - the teams' approach led to more information sharing and thus more material on which to base decisions.

We can expect open discussion of information leads to a group process of changing the information interpretation to increased complexity and better information coverage, resulting in more coherent and more accurate story. Companies and business schools emphasize the value of group work, arguing that the multiple perspectives improve decision quality. Yet groups have good and bad experiences, and experimental results on diversity in teams is equivocal (Crossan at al, 1991). Executive groups face the same challenge. Consensus must be achieved, but to achieve post-decision implementation and commitment, each executive must retain respect and confidence in the others. The story model allows us to explore this issue from a cognitive point of view, identifying precisely where group decision making process are more valuable. This ability to shift to new level of analysis and gain further insight into organisational decision making is precisely where
the story model gains power. An investigation of the group's effect on the story structure would improve our understanding of strategic decision making.

Proposition 7: Executive groups that agree on information evaluation by integrating their stories before discussing and reaching decisions have greater post-decision peer respect that groups that only reach consensus on the decision.

CONCLUSION

The series of propositions and research questions potentially represent a lifetime of research. Yet the importance of understanding and properly evaluating information for making good decisions is, without a doubt, a key managerial task. Percy Barnevik notes (Taylor, 1991) that it is better to make a decision quickly and be wrong 30% of the time, than delay the decision to exhaustively search out all the possible relevant information. What he is suggesting is precisely that good managers learn to make intelligent inferences from the available information, inferences which allow them to act promptly and generally appropriately. As more and more information becomes available to all managers through powerful information technology and dynamic personal networks, efficient evaluation of the information flood becomes more and more of a challenge. Many managers already complain about having far too much to read, and selection and integration is a key skill for success. The story model provides a framework for understanding the managerial challenge.

Within the context of the acquisition decision making process, or more generally the resource allocation process, case research suggests that both the anchor-and-adjust and story models are applicable (e.g. Haspelagh & Jemison, Bower, Burgelman). In addition to the propositions discussed, other extensions of the research are possible. The difference in the process may be specific to the various corporation's style, or may be correlated with the degree of relatedness between the business proposed and the core business of the firm. The two models may also describe different stages or roles in the decision process described by Burgelman. Before the manager becomes a project champion, or more simply begins to work substantively on a project, the information processing of the new opportunity may be best described by the story model. Once a measure of commitment is made, evidence is evaluated continuously as the manager updates the initial judgment. In the case of a distant top manager making a decision at the end of a detailed proposal process, the story model may be the only relevant model.

The story model provides some obvious, and less obvious, ideas for improving managerial practice. In the resource allocation or acquisition process, as described above, the top management may wish to improve the process by creating more of a court room setting, introducing a contrary perspective to the proposal team. This innovation has been suggested before (Schweiger, Sandberg, & Rechner, 1989), but to my knowledge is not used in practice, possibly because of the confrontational structure which could have lingering effects on working relationships after decision making. Top management should definitely discuss their mutual understanding of the opportunities being evaluated, with particular care to understand and agree on the key causal structure of the presented information. This discussion should, if the theory is correct, facilitate for decision
consensus as well as post-decision implementation. At a more subtle level, middle managers may wish to evaluate their personal credibility with top management, and adjust their presentation of information (story or issue order) appropriately. These and other implications lead directly from the propositions, and need no further development.

The idea of causal inference structures can be generalised beyond the story model, although the managerial implications become more vague. Today many firms are trying to increase international, inter-subsidiary communication, perhaps to transfer best practice or new technology. The flow of information across languages and functional or business areas (great communication divides) could be greatly assisted by explicitly discussing the stories constructed by both the information generators and receivers. The process of building causal structure is one way of describing the transformation of data into knowledge. A discussion of the causal inferences could be a crucial part of ensuring comprehension and learning in the transfer process. Not only that, we can assume that the "teachers" will probably enrich their own insight in hearing the "students" interpretation of the new ideas. If, in fact, the causal inferences made by different managerial groups in the firm are radically different due to different underlying cognitive maps, then the differences account for the major communication gaps and disjointed decision making in many diversified or multinational firms. But this point becomes quite speculative.

To conclude, I argue that the proposed research program presents a complex of propositions, developing the theoretical implications of the story model and replicating earlier juror results. Further work is required to broaden the understanding of causal inference making, as developed in reading comprehension research (e.g. van den Broek). The paper has hinted at the pragmatic usefulness of understanding how information is processed and decision are made. The research program also contributes to an understanding of how and why systemic biases develop in managerial decision making. Thus the research program could potentially develop both descriptive and prescriptive theory. Certainly the program answers Simon's (1979) appeal for better understanding of procedural rationality in business.
ENDNOTES

1. An interesting sidelight is that of the oligopoly and tacit collusion literature of IO and strategy. It is argued that when firms have similar goals they have incentive to cooperate, and if they have similar resource bases that have the ability to cooperate because of increased likelihood of correctly understanding each other's signals. In other words, the firms have similar cognitive maps which facilitate communication and coordinated action.

2. Pennington & Hastie evaluated work by other juror researchers, and found that judges did not make the same verdict category and goodness-of-fit judgments, but rather retrieved from memory similar cases in legal history, checked for goodness-of-fit of the current case with the past case, and then 'used' the verdict of the best fitting previous case to make the judgment in the current case (1990). Thus, although the judgment process is more complex, involving knowledge of previous situations, the story building process is similar.
REFERENCES


APPENDIX 1
Summary of Story Model Findings
The Pennington & Hastie Research Program

1. The story model is a valid description of juror decision making. It posits a three stage process of evidence processing into story(ies), identifying verdict categories, and selecting a verdict through goodness-of-fit measures with the story.

2. The story model was demonstrated across oral and printed treatments, and verbal and written responses. Results are not due to communication mode.

3. Jurors' stories directly mention little of the available evidence in their stories. Details irrelevant to the main story line are virtually ignored.

4. The order in which evidence is presented affects ease of story construction, and thus affects judgments.

5. Jurors make inferences from their general knowledge about the world to fill the gaps in their stories. These inferences may be "remembered" as evidence.

6. Confidence in decisions increase with the ability to build coherent stories, especially if other less coherent stories can be constructed.

7. Witness credibility has more impact, either negative or positive, when evidence is presented as a story than other methods of information presentation.