

Decision Making In Management Teams: The Role Of Guiding Principles

Stream 11: Communication and Collaboration

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Abstract

This paper presents a field study of decision-making processes in management teams in two organizations. It reviews existing literature on managerial knowledge structures and decision-making, and identifies methodological and conceptual limitations with these approaches. The authors then develop interpretive case studies of two management teams, which focus on the articulated and social methods used to make decisions. They found that both organizations used rules of thumb or heuristic reasoning in their decision-making, that these rules of thumb functioned as headlines of deeper organizational narratives, and that these narratives were grounded in emotional as well as purely rational considerations. We suggest that the term "guiding principle" usefully integrates our three findings into a descriptive concept that may be further explored in future research of both a descriptive and prescriptive nature.

Descriptors

Decision-making, heuristics, narrative, emotion, guiding principles

Introduction

Cognitive frameworks for decision-making have been the focus of study in the managerial cognition literature for many years (e.g. Lyles and Schwenk 1992). The broad label for such frameworks is "knowledge structures" —mental templates or cognitive filters imposed by individuals on an information environment to give it form and meaning (Walsh 1995: 281). While the extensive literature on knowledge structures provides many useful indications of ways our decisions are influenced "top down", little work has studied how individuals working in teams make sense of issue streams and arrive at decisions in daily practice. The majority of research into decision-making and knowledge structures which have involved studies under controlled environments. In this paper, we use interpretive methods to study contextualized processes in the field. Based on the two case studies, we develop three interlinked findings that describe key elements of the way in which two management teams made decisions. We use the three findings to develop a new concept—guiding principles—that helps shed light on decision making processes in management teams.

Knowledge Structures and Decision-Making

Cognitive scientists have suggested that individuals and collectives such as groups in organizations are influenced by a number of "top-down", theory-driven cognitive mechanisms when they make decisions. Such knowledge structures are imposed on information to give it form and meaning, and have a major impact on decisions separate from "bottom-up", data-driven factors evaluated in the decision process. The study of knowledge structures was incorporated into the managerial and organizational realms over 20 years ago (e.g. Nisbett and Ross 1980), and led to a burgeoning literature studying ways managers process information and make decisions (Walsh 1995).

Knowledge structures can take many forms. Originating within the domain of neurobiology, the notion of cognitive schemata has contributed to the development of the cognitive school of psychology, and subsequently became a focus of study in the literature on managerial cognition. Schemata are cognitive structures that represent one's general knowledge about a given concept or stimulus domain, including its attributes and the relations among those attributes (Fiske and Taylor 1991). Causal schemata provide general conceptions of how certain kinds of causes can produce certain kinds of effects (Kelley 1972). Scripts concern the relationships between social objects and events over time in well-known situations (Fiske and Taylor 1991) and provide a coherent sequence of events expected by the individual (Abelson 1976). On a social level, individual cognitive schemata can combine to form an overall interpretive scheme, which maps an organization's experience of its world, identifying both its relevant aspects and how we are to understand them (Ranson et al. 1980). Interpretive schemes operate as shared, fundamental (though often implicit) assumptions about why events happen as they do and how people are to act in different situations (Bartunek 1984). Such interpretive schemes are sometimes referred to as "shared mental models", which can be defined as an organized body of knowledge that team members have in common (Kim 1997).

It has also been proposed that decision-making is also influenced by one's *values*, which serve as standards that guide the conduct of individuals in a variety of ways (Harrison 1987). Values are enduring beliefs that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse

mode of conduct or end-state of existence (Rokeach 1973), and are typically assumed to exist principally at the level of the individual (Leys 1962). At the level of the group, values have to be reconciled with group *norms*, which regulate the standards of conduct among the members of a collective (Harrison 1987). Norms tend to be behavioural—collectively produced *frames of reference* (Bettenhausen and Murnighan 1985) that help clarify what is distinctive about a group and thus contribute to its identity construction (Feldman 1984). Such frames of reference include fundamental epistemic, ontological and ideological assumptions upon which organizational activity and inquiry is conducted, which can over time become rigid and constrain organizational actions (Shrivastava et al. 1987).

Organized social systems such as firms respond to change through constructing, developing and transmitting *routines*, which constitute the memory and specific operational knowledge, store and facilitate the diffusion of information and help coordinate actions (Nelson and Winter 1982). Routines limit possible actions to specific, socially transmitted skills. External threats can cause individuals, groups, and organizations to cling to well-developed routines or "threat rigidity" (Staw et al. 1981). Organizational habits are routines that develop in response to recurring questions and become accepted practice—actions taken without consciously considering alternatives. *Habitual routines* exist when a group repeatedly exhibits a functionally similar pattern of behaviour in a given stimulus situation without explicitly selecting it over alternative ways of behaving (Gersick and Hackman 1990).

Limitations of Knowledge Structures in Understanding Decision Making

The role of knowledge structures in the organizational decision-making literature reviewed above rests on a few key assumptions. The first is the recurrent notion that decisions themselves are moments in time in which a course of action is selected (e.g. Harrison, 1987). Simon (1965) challenges this view, stating that decision-making should not be treated as a unitary event but a complex social *process* involving the directing of attention, discovery, designing courses of action, evaluating alternatives, and choosing among them. Langley et al. (1995) suggest that the construct of "the decision" itself serves in many ways to reinforce the notion that organizations are mechanistic and bureaucratic entities, in which different individuals in the same task environment would make the same decision. These scholars propose that decisions are not faced in isolation; rather, they are often interlinked with other decisions, into "issue streams" or "issue networks"—sets of interconnected issues evolving dynamically over time (Langley et al. 1995: 274).

Second, at least since the Enlightenment, the idealized form of decision-making has rested on key assumptions of *rationality*, or consistent, value-maximizing choice within specified constraints (Allison 1971). The classical "economic man" or "rational actor" faces a well-defined problem and has adequate skill, time and resources to select the well-defined alternative—about which he or she has full information—that will lead to the highest payoff function. However, scholars have claimed that it is not possible to stand outside reality and gather all the relevant information to make an objective decision (e.g. Rorty 1981), and that reality is socially constructed in a given cultural and institutional context (Berger and Luckmann 1966). Simon (1965) proposed that instead of seeking out a perfect solution to a given problem in a rational manner, people seek solutions they consider good enough in a given a situation—*satisficing*—and the form of rationality it represents as *bounded rationality*. Other scholars have referred to the idealized notion of pure rationality as an unnecessary and "mystifying" limitation that obscures important aspects of organizing

(Shrivastava et al. 1987: 90). Everything that is not purely rational may indeed not be irrational (Gigerenzer 1997), and decision makers should not be considered kinds of machines to which problems, opportunities, and choices happen.

Third, decision-making is largely assumed to be a context-independent activity. However, decision makers also operate within organization-wide, deeply rooted shared convictions—cultures or ideologies—that may influence a wide variety of organizational activities and so link issues (Langley et al. 1995). One of the benefits of decision-making in a social context is the heightened ability to draw on the experience of all the team members to create new and unexpected solutions, options, and interpretations that are beyond the capabilities of any of the individuals (Klein 1998: 245). Drawing on Habermas, Shrivastava et al. (1987) propose the criterion of "social rationality", a form of metarationality that takes into account the degree to which a decision is grounded in free discussions and the consideration of human needs.

Finally, with some notable exceptions (cited below), most of the research into knowledge structures and decision-making has been conducted in contexts that are relatively simple and controlled. Much work has involved the study of individuals in laboratory, rather than naturalistic settings in which other demands are placed on them (Fiske and Taylor 1991), which has led to calls for more fieldwork in this area (Shrivastava et al. 1987; Langley et al. 1995). Those few field studies that have been completed have sought relationships between particular decision making processes and "firm performance" (Eisenhardt 1989a), "effectiveness" (Dean and Sharfman 1996), or "success" (Miller 1997). Leaving aside the critique that such criteria are somewhat arbitrary—others such as "quality", "acceptance", and "originality" have been also been proposed (Harrison 1987)—quantifying any of these performance measures is highly challenging. While Klein's (1998) avoids measuring performance directly, his field studies have thus far focused on fire fighters, military personnel, and medical professionals—rather than organizational management teams.

Method: Interpretive Case Studies

This paper is intended to address some of these lacunae in the decision-making literature through a descriptive field study of issue-stream based decision-making processes undertaken by management teams in two organizations, studied *in their contexts*. It responds to Langley et al's (1995) call for more *in vivo* rather than *in vitro* study of decision processes, adopting a longitudinal perspective that follows processes in real time as well as retrospectively, and focuses on people and personalities rather than just events. Our research approach resembles studies into "naturalistic decision making" (Orasanu and Connolly 1993, Klein 1998), although our focus of study is business organizations.

We developed interpretive case studies of two organizations and focused on how management teams in these two entities made decisions over extended periods of time. Interpretive studies can usefully clarify the contingent manner in which a particular mix of causal powers has been activated in a given context (Tsoukas 1989), see new theoretical relationships (Dyer and Wilkens 1991), and uncover basic assumptions (Schneider and Shrivastava 1988).

Data Collection

The first case site was the development team of LEGO Mindstorms¹, an autonomous, strategic project unit launched by the LEGO toy company to develop a new business opportunity on the boundary of the toy, Internet, and computer industries. We studied the team for a period of 22 months from May 1997 and February 1999, from shortly after the team's establishment until the aftermath of the highly successful launch of the new product. Both primary and secondary data were collected during the study period. The first source of primary data consisted of a total of 27 in-depth interviews conducted in five rounds with members of both the Mindstorms team and individuals in the parent LEGO organization. The informants included nine members of the Mindstorms team and five members of the LEGO organization who had close links with the Mindstorms development process. A second source of primary data was observation field notes generated during discussions between sub-groups of the Mindstorms team and the co-authors. The primary data was complemented by secondary data, which included memos, press releases, drafts of organization charts, internal documents, and other reified organizational artefacts generated by team members during the period of study.

The second case study was Al Inc.², a New York-based company developing artificial intelligence applications for business. A total of six researchers observed and interviewed members of the Al Inc. team over the course of 24 months from August 1999 to August 2001. The researchers conducted 11 in-depth interviews with members of the organization, the results of which were discussed and analysed with other researchers studying the organization. Our secondary data of Al Inc. included e-mail data, internal memos, accounts prepared by team members for public consumption, drafts of strategic plans, and other internal and external documents.

Data Analysis

To better understand the complex relationships that exist within the data, we proceeded with a multi-step process of data collection and analysis. First, we taperecorded the interviews and transcribed the interview tapes. We read and re-read the interview transcripts, notes, and secondary documents, and generated preliminary categories of findings. In several instances, we checked our understanding of the data by producing summaries of key details/milestones and checking the accuracy of this information and several preliminary categorizations with informants.

A considerable body of theory suggests that these individuals fall back on cognitive schema and other knowledge structures in order to make decisions (e.g. Fiske and Taylor 1991). While this may well be the case, it is difficult to observe schemata or other knowledge structures such as individual values directly in vivo. Thus, in analyzing the data collected for this study, we began by identifying a number of key decisions each of the teams faced, then we focussed on articulated (verbally or in written form) and social (expressed by more than one individual) techniques that these management teams used to make sense of groups of decision-related issues. We especially focused on the stories, anecdotes, metaphors, and narratives (e.g. Czarniawska 1998, Beech and McCalman 1997) expressed by management team members with relation to decision processes.

¹The names of individuals involved in the LEGO Mindstorms case study have been disguised.

² All company, individual, and product names in the "Al Inc." case study have been disguised.

The data collection proceeded in an iterative fashion; that is, insights that emerged from early data collection directed the next round of data collection, which led to the refinement of questions, the collection of more data, more insights, and so on. The processes of identifying, interpreting and elaborating in an iterative fashion led to the development of both the case studies amalgamating the data, and to the key research findings. Thus data collection and data analysis overlapped, while the resulting findings were compared to existing literature, with the aim of raising the work's theoretical level (Eisenhardt 1989b).

Golden-Biddle and Locke (1993) suggest that ethnographic work should be evaluated based on the degree to which the author has "been there" and has been genuine to the experience (authenticity), whether or not the story makes sense (plausibility), and the degree to which the text causes readers to reexamine assumptions (criticality). Although our work would be better characterized as ethnographic-inspired rather than pure ethnography, we do address several of these criteria in our analysis. First, we have provided details that particularize the daily life of the team where possible, as well as background information on our relationships with the organizations being studied, and steps taken in its analysis to improve the work's authenticity. Second, we have normalized the presentation of our results to present two stories that connect with readers of our text in a plausible manner. Finally, we link our findings back to existing literature in a manner that we hope will stimulate critical reflection among these same readers. We now turn to a presentation of our two case studies, which will be followed by an outline of our three main findings.

Case Study 1: LEGO Mindstorms

In 2001, the LEGO company was the largest toy company in Europe, and the fourth largest in the world. Throughout the 1980s and early 1990s, LEGO had grown at a controlled pace of between 10-18% annually, although the rate of sales growth began to slow in the late-1990s. At this time, the company was facing a growing threat from new competitors and the challenge represented by the rapid spread of the Internet and technology-oriented toys. LEGO management had found it difficult to encourage the development of radically different products to counter these challenges.

In April 1996, Sam Sinclair left his job with an information technology company to build a new team with LEGO product manager Frank Fulton. The goal was to restart a stalled project to develop a programmable LEGO brick, and launch a new product which would become known as "LEGO Mindstorms". The two project founders were given a mandate to take some partially finished technology, develop an original product, and bring it to market. The project was considered important because it would potentially represent a new direction for the parent company, taking it into what was at the time the relatively unexplored—by LEGO--realm of computerized toys. The Mindstorms team was set up as an autonomous project unit, reporting directly to the senior management of LEGO, but located within part of one of the least profitable businesses of the company, far from the view of most of the organization. From the beginning, they set out to operate in a way quite different from the parent company. "We threw away most of the rulebook, and operated like a small, entrepreneurial business," said Fulton.

Over the two-year period, the team grew from its original two members to include a total of 15 individuals representing several nationalities, from a variety of different

parts of the organization, industry backgrounds, and locations in three different countries where LEGO operates. Many of these people came from outside LEGO. Sinclair quickly ran into problems when he tried to recruit employees from within the LEGO organization to work for the fledgling team. "Many people," he recalled, "didn't want to be too closely associated with Mindstorms...they wanted to maintain some distance in case it failed." It took a great deal of effort for the team to finally acquire a project manager and public relations specialist from the core business. In many cases Sinclair had to resort to hiring external people rather than draw on the knowledge within the LEGO organization.

The team worked to extend its capabilities through the creation of an extensive network of external alliance partners. They were convinced that a strong network of partners would enable the Mindstorms team to take on larger scale tasks than they could accomplish alone, while at the same time staying "lean". As Fulton observed: "I think that is the only way we can be really competitive...there is a lot of expertise that we need to get from the partners outside, that we don't want to develop internally." The partners included a computer manufacturer, a publisher, research institute, an advertising agency, a software coding company, a public relations firm, a museum, and a market research company, many of which had never previously dealt with the LEGO organization. The Mindstorms team worked with its partners in an entirely different way than was usual in the LEGO organization, which tended to handle development and production tasks in-house and keep development projects behind closed doors. When the LEGO company did work with partners it typically maintained complete control, while Mindstorms team members specified that they wanted to work with a wide range of partners on an equal basis. It was hoped that partners would feel a sense of ownership for joint projects, and that operating in this manner would enable the team to, as Fulton put it, "build on existing infrastructure developed by partners wherever possible".

In January 1998, LEGO Mindstorms conducted its global public relations launch. The event was covered by one-half of all US television stations, as well as CNN and the BBC, and was estimated to have reached more than one billion people around the globe. In September 1998 the product went on sale in the United States and the UK, and sales were double the projections—stores were sold-out by Christmas.

Decision Making at LEGO Mindstorms

The Mindstorms team appeared to handle decision-related issues in a manner that contrasted sharply with those of the core LEGO organization. The team strove to run processes in parallel—and across boundaries—instead of sequentially, and allowed more "chaos" than was permitted in the core business. For example, the hardware and software for Mindstorms were developed simultaneously, a style of working that had never been tried in the parent company.

The team set out to treat its alliance partners—many of which were far larger than LEGO Mindstorms—as equals, working with them collaboratively rather than through a relationship of domination. For example, one initiative involved setting up learning centres in which Mindstorms could be profiled to potential users. The team coordinated the initiative on an equal basis with the partner—a children's learning organization—that supplied the facilities, while the Mindstorms team supplied the product. Such an approach brought some new decision-making challenges, as neither partner really controlled the venture.

A common subject of debate was how Mindstorms should be connected to the rest of the organization. In August 1997, after spending a great deal of time and effort building contacts with managers in the core business, Sinclair designed a highly elaborate organization chart showing how his team "fit in" with the rest of the LEGO organization. However, the boxes and arrows of an organization chart seemed inadequate to describe the fundamental differences between the orderly core business that was servicing an existing market on the one hand, and the newer more chaotic team trying to create a new market on the other. Sinclair began adopting a more metaphorical way of describing the linkage, referring to Mindstorms as a "planet" orbiting around the core business. He emphasized that it was important for all new business development ventures to "stay in orbit", not drifting too far away into oblivion, nor getting too close and burning up. This balance would not always prove easy to maintain, and became particularly salient when the team had to make decisions concerning whether to form new alliance partnerships with LEGO competitors, and in organizing the co-launch of a similar product launched by the core LEGO business.

Case Study 2: Al Inc.

Formed in 1997 through the collaboration between artificial intelligence scientist Bob Goodwin and Wall Street economist Laura Pierce, Al Inc. was established to build "the world's first thinking machine". Although artificial intelligence had attracted much interest and investment in the 1980's, it has proved an elusive goal, and this technology's inability to deliver on initial high expectations led it to be largely ignored by the investment community. Goodwin, however, had developed what he claimed to be a radically different approach to artificial intelligence based on an evolving series of "nodes" and "links" representing concepts, which he believed emulated the processes of the human mind. Its "natural language capabilities" allowed this new artificial intelligence system—called "Wow"—to understand what information *meant* in the context of the user and the enterprise. In theory, it could thus tap into the estimated 90% of the world's stored business information residing in text documents, e-mails, and so on—information that previously could only be analysed as fast as decision-makers could read it.

Goodwin began by focusing on developing the Wow architecture, which he anticipated could be completed within just a couple of years. However, he and Pierce soon realized that in order to finance the development of Wow, they would have to spin off some applications or artificial intelligence "components" along the way. For example, under the assumption that "news moves markets", the company began working on an application that would "read" newsgroup postings and predict the market. However, it was a challenge for the company to "close the gap of credibility" with potential partners, so Goodwin developed "valuation events" at which the technology was exposed to potential investors. The need to develop such application demos put a strain on Goodwin, who placed relatively low priority on such tasks. Goodwin explained: "I need to be involved in getting the thinking machine to work, plus I need to do the dog and pony show for investors and potential customers, and so managing application development doesn't get as much attention as it should."

Decision Making at Al Inc.

As the company grew from an initial group of five founders to reach 130 employees at its peak in 2000, the recruiting style of the organization changed. In the early days,

Pierce characterized their approach as "taking inexperienced people we thought were really smart and hire them in for nothing." Goodwin called it "looking for the most brilliant people with the most ideas of their own which relate to what I do", and sought out to attract all kinds of fascinating, brilliant, independent minds to work on Wow. The idea was to give individuals the maximum control over their own lives, and provide minimal hands-on management. However, the two founders realized over time that they needed individuals who, while less brilliant, had more specific experience.

The company faced an important decision when Matthew Lightfoot, a former Wall Street investment banker, suggested that Al Inc. build a Wow-enhanced knowledge management application for legal firms. The company's typical reaction to these new opportunities was to "reorient and redirect" the medium term strategy as they arose, a strategy that led to considerable frustration among the product developers. While Pierce saw the goal as "to become a very successful corporation, successful meaning very high valuations and huge revenues," Goodwin saw the company's overall goal as building the world's first thinking machine, believing that finishing the artificial intelligence system should come ahead of developing saleable components. This difference led to fundamental differences of opinion concerning how to allocate resources. Further, the founders' opinions often contrasted with those of some of the newer, more "professional" managers they brought in, who saw more value in developing applications. For example, the new managers believed the company needed more money in order to develop applications for Wow, while the founders generally wanted to avoid raising too much money from venture capitalists as this would dilute the founders' share. Yet expenses were increasing rapidly.

The bursting of the dot.com bubble would deal AI Inc. a fatal blow. Their partially developed component strategy meant that by the time they were almost ready to sell a particular component such as intelligent web search, most of the Internet companies who would have been potential buyers had gone bankrupt. As important deals fell through, AI Inc. had to engage in round after painful round of layoffs, and ultimately declared bankruptcy in April 2001.

Finding 1: LEGO Mindstorms and Al Inc. used Heuristic Reasoning When Making Decisions

In studying the decision-making processes of the LEGO Mindstorms and AI Inc management teams, we observed that both teams appeared to make frequent use of "rules of thumb" when making and subsequently justifying their decisions. Although individual schemata may have influenced the development of these rules of thumb, each one was shared broadly and frequently articulated by many individuals in each group. However, unlike behaviour norms or frames of reference, these rules of thumb did not resemble mental templates used to order the teams' environments in the manner of knowledge structures. Instead, they provided explicit, probabilistic decision-making guidance, thus more closely resembling an approach to problem solving incorporating *heuristic* reasoning.

Heuristic Reasoning in LEGO Mindstorms

The following three rules of thumb were frequently articulated and used by members of the LEGO Mindstorms team:

"Stay in orbit": Drawing on the metaphor of a satellite orbiting a planet, this phrase provided a means for the team (and the parent LEGO company) to make sense of the relationship between the two entities: they were linked by an invisible yet powerful gravitational force. This heuristic-like device came into play when the team was developing a common public relations statement with the parent company, while striving to maintain its own identity. It also helped the team better make sense of how it could draw on the well known LEGO name while not having to adopt the parent company's operating practices.

"Parallel process": the team explicitly set out to avoid the step-by-step, "follow the game plan" approach to operating of its parent company, in favour of working on several tasks at the same time. In this way, it reflected the constantly changing business environment it was facing. An engineer explained how this approach increased the team's speed: "because most of the development progress has been done in parallel, we haven't had to wait for each other to finish things before we could continue with others."

"Be a real partner": the team did not feel the need to assume a dominant position in its alliances, which would allow it to work with a wider variety of both large and fledgling partners. Working with partners in this way was cited as being a critically important starting point for building a "real network" that would extend beyond immediate product development needs to facilitate the creation of a broad-based community of users that would communicate with each other using the product's website.

Heuristic Reasoning in Al Inc.

The Al Inc. management team based many of its important decisions on the following rules of thumb:

Hire based on intelligence. Rather than basing their hiring decisions on how well the candidate fit into the existing organization, Pierce and Goodwin believed in hiring individuals based on their raw talent. Pierce called it "taking inexperienced people we thought were really smart and hire them in for nothing". Goodwin called it: "look for the most brilliant people with the most ideas of their own which relate to what I do".

Avoid dilution. From the beginning, the founders of AI Inc. wanted to avoid at all costs giving up control of the company (dilution). The company founders made clear at several points in our interviews that many potentially beneficial alliances were being refused based on this heuristic, and the following statement appeared in the company's April 2000 strategic plan: "This option (securing a large investment to conduct 2-5 years of R&D) was deemed undesirable because the amount of funds required to pursue it would require us to immediately hand over control of the company to the major investor".

Build the AI machinery first. In allocating resources and evaluating the desirability of undertaking new projects, members of the AI Inc team expressed a core desire to prioritise finishing the core AI product before worrying about business applications. This line of thinking was evident in Goodwin's comment that "after Wow is finished, the rewards will take care of themselves and we will be richly compensated in a variety of ways". Use of this heuristic also meant that the company did not spend much time seeking out customers for its product. As Goodwin stated: "...until someone writes me a cheque, let's know what our long term goal is and just work toward it."

Theoretical Implications: Heuristic Reasoning

Heuristics provide simplifications that limit the need to search in problem solving situations (Harrison 1987), thus enabling rapid decision making in situations in which gaining a full understanding of all relevant factors is impossible. Chess masters use heuristics—such as "dominate the centre of the board"—to find acceptable solutions to complex problems without having to search the entire landscape of possibilities.

Different schools of thought have emerged concerning the value of heuristics, and the concept has become somewhat controversial. On the one hand, some scholars believe that heuristics fundamentally and systematically push decision-making away from pure rationality. They need to be uncovered in order to subsequently be avoided. In the 1970s, social and cognitive psychologists conducted extensive studies into heuristic "biases" or cognitive "errors"— shortcuts humans take that block them from making "effective decisions" which, they argued, often lead to fallacious conclusions and errors of judgement (Fiske and Taylor 1991). These conclusions were set out in the seminal work of Kahneman and Tversky (1973), who grouped heuristic biases into representativeness, availability, and adjustment & anchoring. Several organizational scholars have found evidence that heuristics lead to poor decisions. Corporate acquisition and divestment decision-making processes were associated with heuristic biases such reasoning by analogy, escalating commitment. illusion of control, and single outcome calculation (Duhaime and Schwenk 1985). Barnes (1984) found strategic planning exercises were prone to biases of availability, hindsight. sampling misunderstandings, correlation and representativeness. Drummond (1994) found evidence of escalation of commitment in a series of crises faced by a city council department.

Other scholars have distinguished between relatively static and deeply ingrained biases, and heuristics, which may be honed and used more extensively. Gigerenzer and Todd (2000) propose that simple "fast and frugal" heuristics can be useful if they are robust in the face of environmental change and generalize well to new situations. Making decisions requires the ability to simplify a complex situation sufficiently well to take context-specific action in real time, as our limited cognitive resources mean we "use approximate methods to handle most tasks" (Simon 1993). The rough form of probabilistic reasoning underlying heuristics may be a highly efficient and effective way of making decisions, although it can make no guarantees (Perkins 1981). Heuristics might be useful if they save time in analyzing all possible alternatives and provide correct or partially correct judgements more often than not (Harvey 1998).

Our finding that the LEGO Mindstorms and AI Inc management teams used heuristic reasoning when making decisions supports Eisenhardt and Zbaracki's (1992) suggestion that organizations in fast paced and uncertain settings use decision-making tactics or heuristics. It also appears consistent with Eisenhardt and Sull's (2001) proposal that organizations apply a set of "simple rules" in developing strategy. However, the rules of thumb we observed in these teams differed in many ways from simple rules, and it is these differences that led us to develop the following additional findings.

Finding #2: The Heuristic Reasoning in LEGO Mindstorms and Al Inc. Involved Narratives

Much of the literature on heuristics implies that these devices are employed in the context of making "if-then" decisions. However, in the cases of LEGO Mindstorms and Al Inc, their rules of thumb embodied *narrative*—rather than paradigmatic—modes of logic (Fiske and Taylor 1991). The narrative mode of logic privileges internal coherence to develop themes necessary to understand actors' motivations and intentions, and draws heavily on prior schema (Fiske and Taylor 1991). The paradigmatic mode favours rigorous classification and explanation according to consensual rules of acceptable evidence, with logical, hierarchical relationships combining to form general laws. Rather than paradigmatic simple rules, we suggest the rules of thumb we observed in LEGO Mindstorms and Al Inc. may usefully be thought of as *narrative headlines* developed in each of the two organizations.

"Stay in orbit" contained elements of a story, and it outlined three possibilities for the relationship between Mindstorms and the core business: the team could drift too far away and disappear into oblivion: it could get to close to the core and burn up: or it could keep moving but "stay in orbit". Although this story was based on the metaphor of a satellite orbiting a planet, "stay in orbit" was an active story more than a static metaphor; it described how the team could mediate tension between the two entities by distinguishing and including at the same time. "Parallel process" embedded an ongoing narrative of the Mindstorms team progressing on several development tasks at the same time, in order to complete its task more quickly than that of the LEGO company, which used a slower, sequential model of product development. A Software Specialist who worked on Mindstorms commented: "We didn't have to wait for everyone to finish things before we could continue with others." This story also called to mind the possibility of being able to quickly identity new problems coming up to the surface. "Be a real partner" included the story of how the team should "build on existing infrastructure developed by partners wherever possible." Team members stated that by being a real partner, they would be able to put in place many of the building blocks for developing a network of customers and partners. This story was unusual in the LEGO organization, which had typically handled most of the development and production tasks in-house and traditionally maintained complete control over its subordinate suppliers.

In AI Inc., "hire based on intelligence" evoked the story of AI Inc. as a collection of very intelligent individuals who band together to build the first "worldwide brain." In such a context, the primary hiring criterion would be intelligence, rather than specific competences. "Avoid dilutior" built upon the articulated desire of the founders to build a company that would not be beholden to external parties such as venture capitalists who would control its agenda. "Build the AI machinery first" evoked a story of an organization that was trying to change the world through its new AI paradigm, and that would not want to be sidetracked along the way in a rush to build revenue-generating applications.

Theoretical Implications: Narrative

It has frequently been proposed that storytelling informs decision-making processes in organizations. Storytelling helps us consolidate our experiences to make them available in the future, either to ourselves or to others (Klein 1998). Brown and Duguid (1991) found that storytelling allows individuals to keep track of the sequences of behaviour and their theories, and thereby to work towards imposing a

coherent, causal account on apparently random sequences of events to decide what to do next. Stories thus also act as repositories of accumulated wisdom. Good stories are packages of different causal relationships, and the more complexity and subtlety, the more there is to be learned (Klein 1998).

Organizations have been compared to collective storytelling systems in which stories are performed as a key part of sensemaking (Boje 1991). Barry and Elmes (1997) propose that the ability of stories to handle the simultaneous presence of multiple, interlinked realities, makes the useful for capturing the diversity and complexity present in strategic discourse. Storytelling is an inherently social process, and the insights accumulated are not private substances, but socially constructed and distributed (Brown and Duguid 1991). To the extent that narratives are linked into broader discursive structures that influence their interpretations, they can be used to justify and legitimise actions (Vaara 2002).

The LEGO Mindstorms and AI Inc. organizational rules of thumb can be thought of as headlines of broader shared narratives within each of the teams. The headlines, when invoked, called to mind narratives that guided decision-making in each team. However, we also found that these narratives were not merely rational, cognitive repositories of wisdom, which leads us to our third and final research finding.

Finding #3: The Heuristic Reasoning in LEGO Mindstorms and Al Inc. Incorporated Emotions

Another element distinguishing the heuristic reasoning used in these two organizations was the strong emotional appeal the heuristics seemed to hold for the members of each team. By emotion, we mean a "complex assortment of affects, beyond merely good feelings and bad, to include delight, serenity, anger, sadness, fear, and more" (Fiske and Taylor 1991: 411). Emotional factors appeared to influence how team members proceeded information coming both from their external environments and from within the team itself, and lent extra weight to the narrative headlines used as rules of thumb.

Stay in orbit allowed Mindstorms team members to retain some of their connection—very strong in many members—to the LEGO organization, while balancing the other strong desire for independence among members. Parallel process called to mind a pride in the team's ability to operate and spot upcoming problems far more quickly than the parent company was capable of. Be a real partner became a rallying cry among team members to build relationships with partners not merely for short term economic gain, but also to create a broader-based movement.

In AI Inc., *Hire based on intelligence* enabled team members to feel pride in their association with this organization, as only smart people need apply. *Avoid dilution* meant the primary goal of the organization was not short term economic gains and security, but rather was a desire for control over their own work. *Build the AI machinery first* drew upon the desire among members of this team to be part of an artificial intelligence "revolution" that had the potential to change the world.

Theoretical Implications: Emotions

Albrow (1992) has described the silence on feelings as a 20th century aberration at odds with earlier understandings of organizations. Thagard (2001) has claimed that

emotions play a significant role in the process of scientific discovery, while Callahan (2002) has proposed that emotions can become external or social phenomena that contribution to the emotional structuration of organizations. Yet while emotions have more recently been the subject of some study within the realm of cognition research (Fiske and Taylor 1991) very little fieldwork has been conducted in this area in the field of management.

Most of the existing literature on emotions and management studies implies that emotions are something to be managed and suppressed, principally on the grounds that they interfere with rationality. Reminiscent of Barnard's (1938) distinction between "logical" reasoning (capable of being expressed in words and symbols) and "nonlogical" decision processes (not capable of these forms of expression), Simon distinguishes between "nonrational" (based on intuition and judgement) and "irrational" decisions (based on "stressful emotions"). Simon's faith in intuition is clearly no abandonment of analysis, however, as he defines intuition as simply analysis "frozen into habit" and thus readied for rapid response (Simon 1987:63). Still embedded within the cognitive domain, he argues that intuition is just the brain's ability to recognize "chunks" of information that we recognize, largely elaborate "ifthen" conditions that can be programmed in the same way as an expert system.

Such an approach considers emotional factors as detrimental to effective decision-making, whereas Langley et al. (1995: 261) propose that decision-makers are also driven by emotion, imagination, and memories, which "are punctuated by sudden crystallization of thought". Other scholars have suggested that emotions can serve rationality. For example, negative emotions like anger underline the credibility of threats, while love and affection support the credibility of promises to cooperate (Fineman 1999). Significantly, unlike what rationalist approaches to decision-making suggest, Korsgaard et al. (1995) found that achieving positive affect within a team did not adversely influence the quality of decisions.

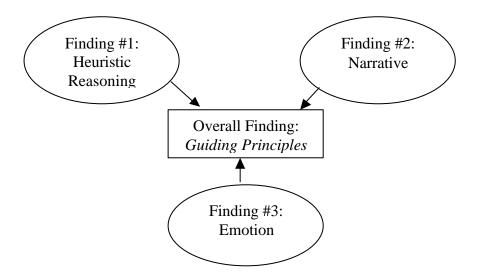
Emotions have also been reported to be useful in alerting and focusing individuals to important changes in the environment, preparing appropriate response strategies and anchoring events of great importance in the individual's long-term memory (Scherer and Tran, 2001). Shrivastava et al. (1987) have insisted that organizational members are feeling, emotive, affective, human beings, who often make decisions based on an emotional understand of issues. Although not without its problems (Martin et al. 1998), creation of emotional needs and their satisfaction in organizations can give rise to a distinct form of emotional rationality that underlies organizational action, which affect the cognitive components of organizational frames of reference.

Overall Finding: Guiding Principles

It is our contention that the three interlinked findings reported here point to a higher-level concept—"guiding principles"—that improves our understanding of decision-making processes in organizations (see Figure 1). Guiding principles operate similarly to heuristics: they can be used as a means of simplifying complicated organizational and business environments much like rules of thumb. However, the phrases themselves are only useful insofar as they call to mind deeper narratives shared within a management team, which when invoked provide access to far richer guidance on effective courses of action. Such narratives help managers keep track of and consolidate their experiences to make them available now and in the future—to themselves and to others. Finally, guiding principles evoked emotional—in additional

to rational—responses in the management teams we studied. More than rational chains of events, the narratives underlying the guiding principles we observed evoked strong feelings, which served to anchor the principles in managers' long-term memories, and improve alertness and responsiveness to important environmental changes.

Figure 1: Conceptual Grounding For Guiding Principles



A principle has been defined as a general truth on which other truths depend—a fundamental that can be reached by induction (Peikoff 1991). Principles integrate our conceptual knowledge at an appropriate, "mid-range" level of abstraction (Locke, 2002: 198). Guiding principles do not outline various kinds of detailed decision criteria; rather, they call upon narrative logics and forms of understanding among individuals, and are used to guide specific actions in specific contexts. Guiding principles are thus not as specific as "simple rules" (Eisenhardt and Sull 2001), but they may constitute a form of foundation upon which such rules can be developed.

We are proposing this new term for two main reasons. First, we believe that "guiding principles" more closely describes the decision making processes in the organizations we studied than any of the existing terms in the knowledge structure literature, many of which are burdened with cognitivist history and assumptions and thus cannot be easily broadened to include narrative and emotional decision-making logics. Second, it is our hope that by presenting this new term within the context of an empirical study and situating it within its broader nomological net (Cronbach and Meehl 1955), we will prompt further research in this area.

Conclusion and Future Research Directions

The vast literature of research into cognitive knowledge structures forms a useful basis for beginning to understand organizational decision making, yet this literature has several shortcomings. Much of its data is predicated on overly simplistic assumptions related to: 1) the singular nature of "decisions", 2) the purely rational basis on which good decisions should be made, and 3) their isolation from social context. Much of the data has been gathered in laboratory settings rather than in the

field, and has typically sought to measure decision quality using a variety of dependent variables. Very few studies have attempted to explore decision processes in business environments.

In our interpretive field study of two firms operating in such environments, we have made several observations. First, the management teams we studied tended to use heuristic reasoning in making their decisions. Second, the rules of thumb these teams used were not purely cognitive devices, but were invoked in much the same way as headlines of broader organizational narratives. Third, these rules of thumb carried considerable emotional as well as cognitive weight with management team members. We combine these three findings from the field to develop the concept of "guiding principles", which describes heuristic-like devices that draw on narrative and emotion in guiding decision making in management teams.

Future research may fruitfully examine some of the process issues involved in developing guiding principles. What is the impact of the development process of guiding principles on their subsequent use? Might guiding principles developed in a collaborative manner be more widely used and helpful than those that were not? Several scholars have called for more use of narrative analysis in organizations (e.g. Dyer and Wilkins 1991), and further research into the connection between emotion and knowledge structures has already been referred to as "one of the most important new research directions the field can take" (Walsh 1995: 307). Are some narrative forms and particular emotions more salient than others in guiding decision-making? By improving our understanding of guiding principles along these lines, we may be able to complement this initial descriptive study with prescriptive work on how they might be intentionally developed and employed.

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