

MAPS FOR MANAGERS: WHERE ARE WE? WHERE DO WE GO FROM HERE?

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ABSTRACT

Research on managerial cognition in general, and on cognitive mapping in particular, is receiving a great deal of attention in Europe and the US, but the work being done is currently disparate and loosely coupled. Furthermore, the development of maps as a decision aid has tended to focus on specific sub-areas of cognition. In this article we argue that the broad strategic concerns of managers require a portfolio of different kinds of cognitive maps. The interactions among these maps are as important as the functions of each one separately. We develop a framework for classifying cognitive maps and argue for the importance of managing multiple maps.

INTRODUCTION

What is a map? It is a graphic representation that provides a frame of reference. For geographers, a map is a means of depicting the world so that people understand where they are and where they can go. For cognitive researchers, who often use the idea of a 'map' as an analogy, the basic idea is the same. Cognitive maps are graphic representations that locate people in relation to their information environments. Maps provide a frame of reference for what is known and believed. They highlight some information and fail to include other information, either because it is deemed less important, or because it is not known. They exhibit the reasoning behind purposeful actions.

Cognitive maps are of potential interest to managers because they are a means of displaying graphically the firm's current strategic position, as various observers understand it, and because they hold the promise of identifying alternative routes to improving that position. Our discussion emphasizes this action-oriented role of cognitive maps. We are interested in how maps can be linked to strategic decisions and actions. Assessment of current position, relationships among key actors and events, and the possibil-

ity of improved position are the basis on which organizations act or fail to act. We are thus less interested in cognitive maps as representations of thought itself, and much more interested in them as representations of thought that can be related to decision-making.

While cognitive research shows that people do use map-like structures to make sense of information (Lakoff, 1987; Neisser, 1987; Sowa, 1984), many of these maps are in the form of ingrained and taken-for-granted assumptions, and thus are hidden even from those who use them. Research on cognitive mapping has attempted to make these structures more visible (Huff, 1990). In addition, those interested in cognition in organizational settings have worked to elicit the structures that are shared among individuals (*e.g.*, Bougon *et al.*, 1977; Eden *et al.*, 1981; Fiol, 1991a).

This article surveys some of this work on managerial mapping. Its primary purpose, however, is to draw into a single framework the disparate components of previous work and to stress the need to manage the intersection of multiple map types.

FOUR EXAMPLES OF MANAGERIAL MAPS

Since the subjects of human cognition are diverse, and cognition is shaped by many things, it is not surprising that the cognitive maps researchers have identified are similarly (and appropriately) diverse. Before discussing the current state of the art of cognitive mapping and suggesting future directions for this work, several examples of mapping projects that rely directly on interaction with managers help to illustrate the range of current work in this area.

Until recently, research on managerial mapping has focused almost exclusively on the causal inferences embedded in managers' thinking. The general premise of this work is that strategic decisions are based on beliefs about causality. The well-known study by Bougon *et al.* (1977) of the Utrecht Jazz Orchestra, for example, described the causal links people drew between givens, means, and ends. 'Givens' for members of this orchestra included things like the difficulty of the piece being played; 'means' had to do with things like the amount of time spent rehearsing; and 'ends' focused on the quality of the final performance. The first 'map' of these connections took the form shown in figure 1.

Factors with many 'out' arrows are the givens in this generalized map; those with arrows both 'in' and 'out' denote means; while those with many 'in' arrows mark important ends.

Recent research has begun to draw attention to map types that are not explicitly causal in nature. Bowman and Johnson (1991, p.3), for example, have drawn on arguments made by Mason and Mitroff (1981) and Cosier and Schwenk (1990) that 'surfacing what is taken for granted in the process of strategy formulation' will lead to healthy critiques and lower-risk strategies. Their work with managerial perceptions of strategic alternatives at the SBU level indicates considerable variance among managers in some firms about the most basic trade-offs between cost-based and differentiation strategies.

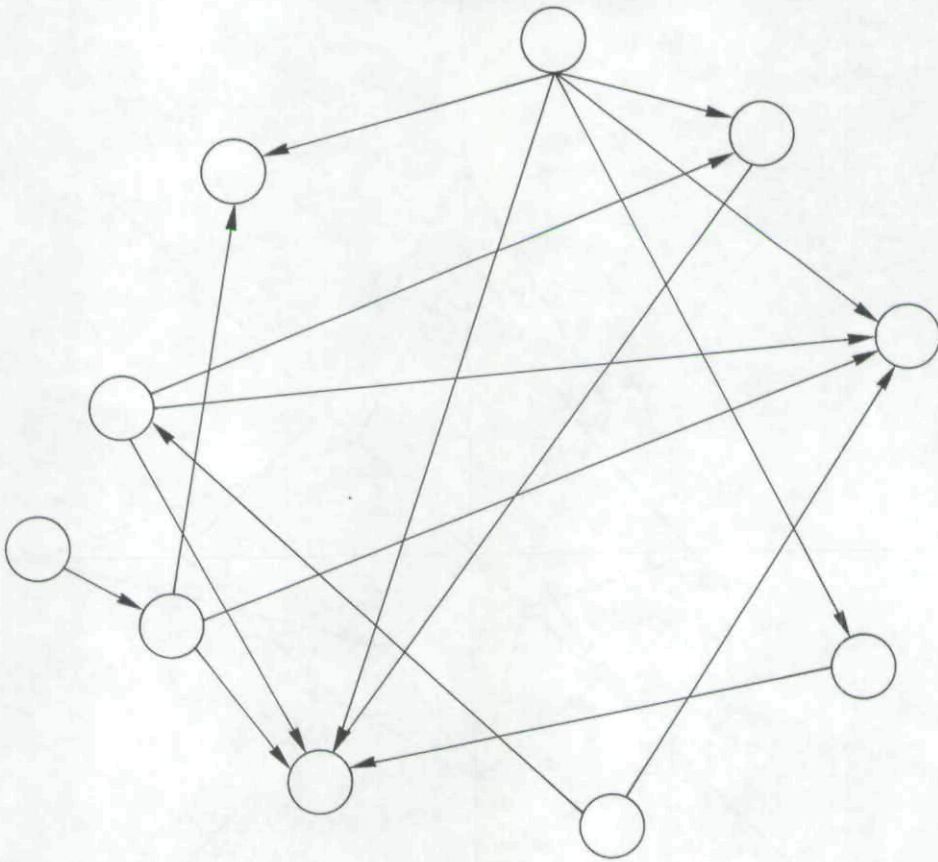


Figure 1.

Bowman and Johnson's experience is that revealing these discrepancies in graphic form leads to helpful debate not just about alternative strategies, but about schisms between various subgroups of the management team, and between managers and directors.

The map reporting this work, which takes a form also used by Walton (1986) and others, can be plotted on x and y axes directly from factor analysis. A more generic map, which is also used by Bowman and Johnson (1991), can display the relative emphasis given to a larger number of variables. The weights given to different strategic dimensions by different actors might be highlighted by connecting points on each vector. The 'star' that results, as shown in figure 2, illustrates by its deformation the strategic emphasis of different informants.

While Bowman and Johnson have been concerned with perceptions about strategic alternatives, Porac *et al.* (1987) are interested in the way managers compare their firm with competitors. Drawing on work in classification theory (Kempton, 1978), these researchers elicit maps from managers that locate the firm in a hierarchy of firm types, as shown in figure 3.

A map of this type demonstrates how managers classify their firm (shown on the map as a darkened square) as one of a subset of firms of the same

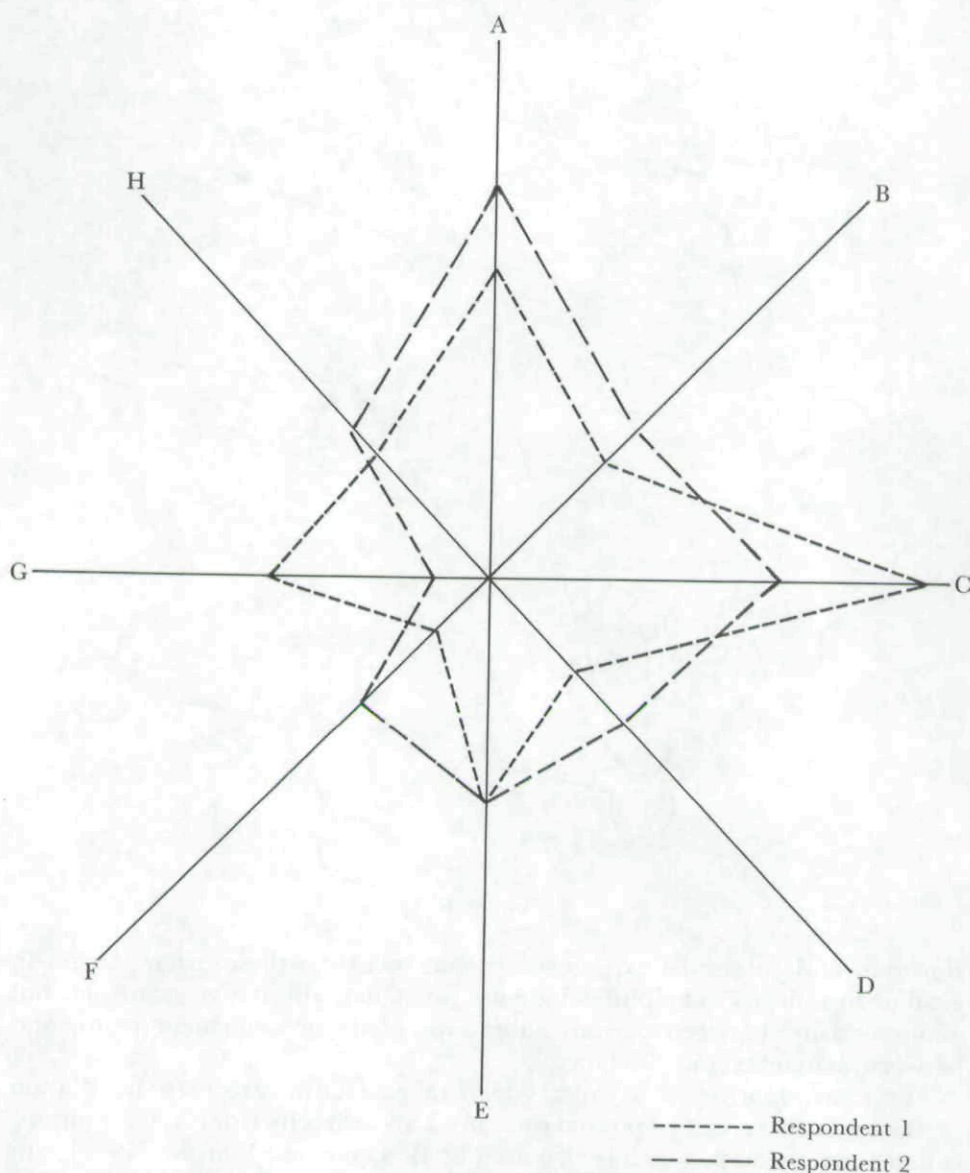


Figure 2.

general category, and how the actions of more specific 'niche players' are subsumed by the activities of firms with more generic activities. Porac and his associates find that even though an outside observer might think of two firms as very similar (two restaurants serving pizza, for example) many nonetheless define themselves in very different ways (one a family restaurant, perhaps, the other a fast food outlet). Differences of this magnitude in perceptions about the competitive environment might be expected as the result of different strategies; they also lead to different strategies.

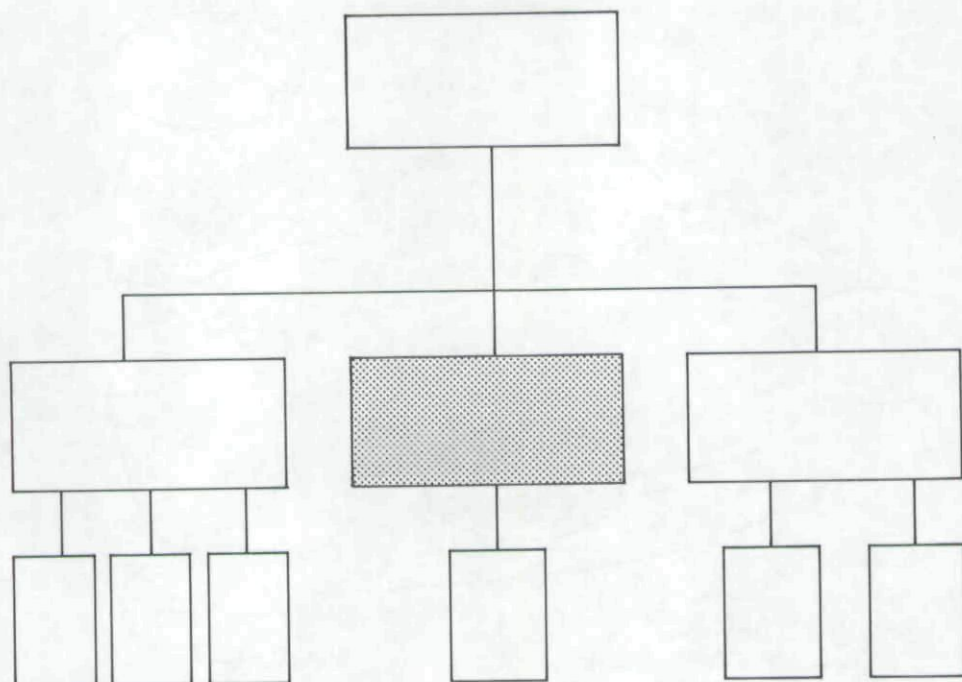


Figure 3.

Eden and his associates have been more concerned with ongoing needs of managers to understand the way in which they interact with their environments. In a series of action research projects with different kinds of organizations (Eden and Ackermann, 1992; Eden and Huxham, 1988), these researchers have generated maps of the general type shown in figure 4.

Extending ideas found in personal construct theory (Kelly, 1955), these researchers view the manager as an active 'scientist' who is 'constantly trying to make sense of the world in order to act within and upon that world' (Ackermann, *et al.*, 1991, p. 2). This work is particularly close to the interests of this article, because the analyst's job is seen as 'cod[ing] argumentation about policy issues so as to reveal or highlight the implications for action in the way the issue is constructed' (1991, p. 2). The implications for action are found in the way a manager links different issues; the mental map highlights these connections (Eden *et al.*, 1983).

CATEGORIZING MAPS BY COMPLEXITY AND USE

Figures 1 to 4 give some sense of the many graphic forms that maps of managerial cognition might take. They also illustrate the range of topics that might be explored with cognitive mapping technologies. These maps are potentially important because they provide a way to structure and simplify thoughts and beliefs, to make sense of them, and to communicate information

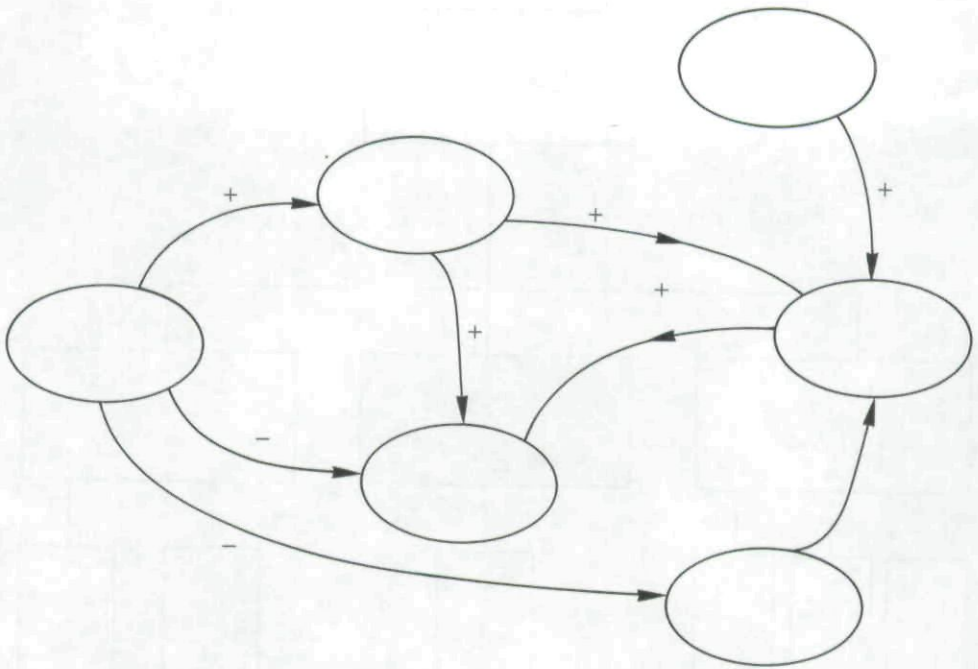


Figure 4.

about them. Though these tasks have long been recognized as important for managers, we argue that the nature and critical role of cognitive maps as frames of reference are changing. Not only do cognitive maps have the potential to play a more important role today than ever before; there is a growing need to specify and manage the intersections of different kinds of cognitive maps.

To initiate our arguments about the shifting nature and role of cognitive maps, we point to two different ways of categorizing maps. One important distinction contrasts 'strip maps' with 'context maps'. Tolman (1948) defined strip maps as a sequence of clear choice points. For example, directions to a house in the mountains might take the form: 'from Broadway, go west on Linden, turn left at the first intersection, turn right at the next intersection, then left, then right'. A strip map of this type can easily take a graphic form, but it is often so simple that it can be memorized and transferred from one individual to another in verbal form. Of course the first-time visitor has no sense of the setting within which these straightforward directions will be followed, but the choice points are all the more clear for this simplification. As long as there is complete certainty about the route, a strip map is very useful: it avoids distractions and it invites efficient behaviour. Even second- or third-time visitors, however, are likely to find it difficult to arrive at the destination pinpointed by a strip map if there is a road block or if they take a wrong turn by mistake.

Tolman (1948) contrasted strip maps with more complex cognitive maps, suggesting that the latter encompass not only specific choice points, but also

information about the context surrounding these points. These more complicated maps provide a sense of the setting within which decisions are to be made. They provide detail about features of the terrain, and about the way these features might be linked. Because these context maps are more complex than strip maps, transmitting their contents from individual to individual is likely to require graphic as well as language aides.

Even though every map is, of necessity, a simplification of the detail that might have been provided, the fact that context maps provide important information about features of the broad terrain, not just a sequence of connected features within that terrain, means that users can exercise judgement if an anticipated sequence of actions is thwarted. In fact, a context map becomes *more* useful once a planned sequence of steps cannot be carried out; because these maps can distract action takers with the richness of information they provide.

A second way of distinguishing cognitive maps involves the way they are used. Maps can be products, designed to remain relatively stable over time; or they can be tools which people expect to modify and even abandon over time (Weick and Bougon, 1986). Managers have long recognized the importance of map-like products. Many of these maps are simple strip maps, summarizing the routines of the organization. Others are more complex maps that give context as an aid to understanding more difficult tasks or to help to persuade the recipient to carry out tasks in the prescribed manner.

Immutable strategic plans are becoming less useful in a world of rapid technological changes, emerging markets, and shifting market boundaries, and strategic planning has come under attack for generating rigid products (Gray, 1986). Today's emphasis on strategic *thinking* as an alternative to or extension of formal planning creates a need for decision-making tools that can be modified as the decision context changes. The map as a product of past cognition is thus less useful, just as the plan as an end product of an elaborate decision process is less useful. Instead managers need sense-making tools that can generate inputs to a continuing stream of decisions.

A basic argument of this article is that context maps used as tools are increasingly important in an uncertain world that requires managerial judgement. Cognitive maps as tools provide new ways of examining and improving managerial judgement. The graphic representation of a mental map is in itself a useful form for helping managers to make sense of complexity. Graphic representation can both simplify ideas and facilitate the transmission of complex ideas from individual to individual and unit to unit. Most important, graphic representation helps to divorce ideas from specific speakers, making them more accessible to debate and modification.

Figure 5 juxtaposes the two dimensions of map definition just described and summarizes via the diagonal arrow our argument that researchers interested in the practical concerns of managers need to focus increasing attention on context maps as tools. Managers must make sense of changing environments and update the context in which decisions will have to be made, even before the specific choice points that a strip map requires become clear. This transition forces us toward trying to understand un-mapping and re-mapping as much as mapping. We need more research on how cognitive

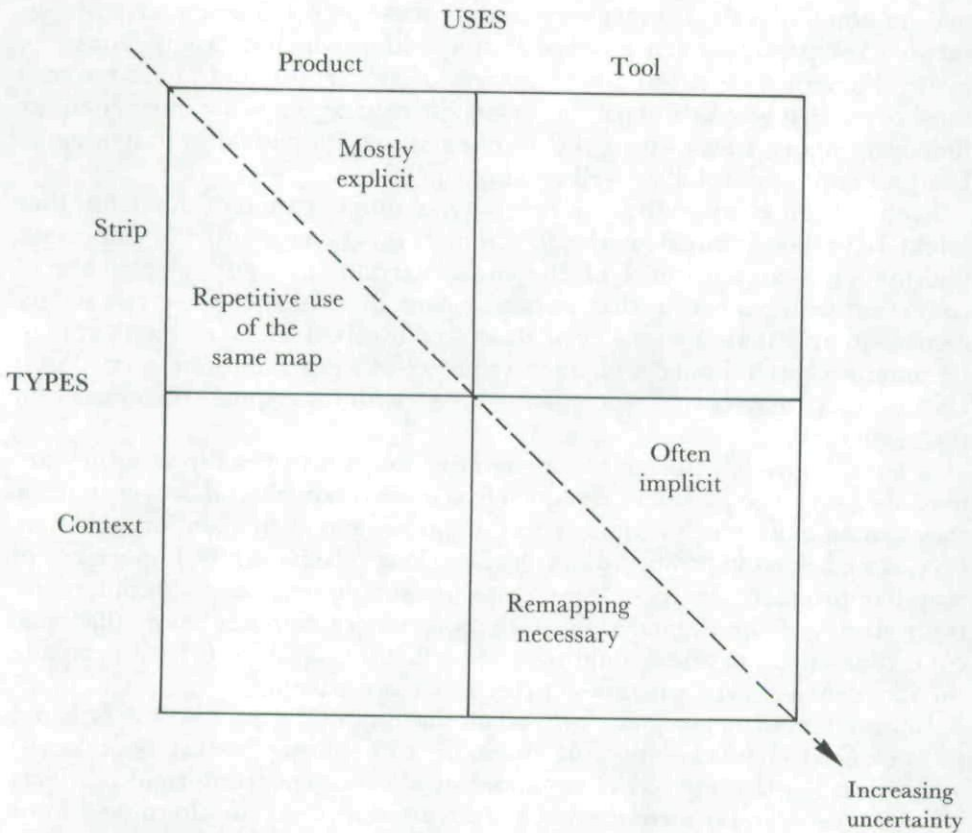


Figure 5. Two key dimensions along which maps differ

maps change over time and more intervention tools that facilitate that change in appropriate ways.

WHAT DO MANAGERS NEED TO KNOW ABOUT MAPS?

If we agree that cognitive maps are important, and especially that context maps as tools are increasingly useful to managers today, we must next address the question of what managers need to know about these maps in order to manage them and benefit from them. It is one thing to say that maps are an important way of understanding and perhaps helping to change a company's position in relation to other actors and events. It is quite another to know how to use cognitive maps to a firm's advantage or to know how to manage the mapping process.

We argue that managers need to know two things about cognitive maps. First, managers must be aware of the functions of such maps. Quite a lot of research has already focused on this aspect of what managers need to know (Huff, 1990). We submit, however, that knowledge about map functions, taken by itself, offers little concrete guidance for managers attempting to

utilize these tools. As is the case with maps of the physical world, the helpfulness of a cognitive map depends on one's ability to choose the right map or set of maps. The utility of cognitive maps also depends on the user's ability to locate current position, desired new positions and the routes between the two. The second thing managers need to know, then, is how to identify appropriate maps and how to draw upon the information they convey.

A particular difficulty of complex organizations is that the maps that are available, or can be made available through research, convey only parts of the relevant terrain. Furthermore, they often conflict and are in a state of flux. To benefit from the expanding technology of cognitive mapping, managers must be able to compare alternative opinions about current locations, improved positions, and the routes between them. These interrelated activities draw on different types or aspects of cognitive maps. Beyond knowing the general functions of cognitive maps, then, managers must learn to recognize and balance the interdependent aspects of multiple maps. We therefore present a brief review of current research on the general functions of managerial maps, and then turn to critical, but underdeveloped questions of managing a portfolio of maps.

FUNCTIONS OF COGNITIVE MAPS

In general, the assertions of management researchers about map functions rely heavily on the work of cognitive psychologists. A major premise of current research is that the direct cognitive-level functions of mental maps (functions which if made explicit at all, are generally inferred from research in cognitive psychology) can be translated into a consistent set of indirect behaviour-level functions relevant to decision-making and action (see Dutton and Jackson, 1987; Kiesler and Sproull, 1982). A number of important direct functions of managerial maps and the associated indirect impacts on decision-making are summarized in table I.

At the level of the individual, cognitive maps have been touted for their ability to *focus attention* and *trigger memory* (Alba and Hasher, 1983; Nelson, 1977). Dutton and Dukerich's (1991) study of managers' mental maps at the Port Authority of New York and New Jersey, found that the technical

Table I. Map functions

<i>Direct operation</i>		<i>Decision-making function</i>
Focuses attention	→	Issue structuring
Triggers memory		
Reveals gaps	→	Issue closure
Highlights key factors	→	Creative problem-solving
Supplies missing information		

Table II. Function trade-offs

<i>Too little</i>		<i>Too much</i>
Splattervision	Focus	Tunnel vision
Inefficiency	Memory	Mechanistic behaviour
Analysis paralysis	Closure	Inflexibility
Fragmentation	Agreement	Group think

background of most key decision-makers played a key role in focusing their attention on particular issues, and influenced the ways managers dealt with and reacted to the growing number of homeless people in Port Authority facilities.

The positive side of these cognitive processes is that they help managers to draw disparate interpretations together. The map that reminds individuals of past experience helps to reap the benefits of experience.

Maps can help *highlight priorities*, a function that comes into play when a manager faces too much information. In the opposite situation, where there is not enough information on which to act, the general categories that make up a map suggest the patterns by which one can assume what one does not know; they literally *supply missing information* (Abelson, 1981; Cantor and Mischel, 1977). Maps that signal priorities when too much information is available, and that supply missing data when information is missing, can play a significant role in managerial decision-making. They can provide closure when managers are plagued by 'analysis paralysis'.

Finally, graphic representation can also reveal gaps in information or reasoning that need more direct attention. A causal map, for example, invites questions about whether the listed factors account for some outcome adequately. Further idea generation may help to improve understanding and action, and lead to new creative ideas.

These functions of a cognitive map have important potential for organization decision-making. Each helps the manager resolve potential problems in the decision-making process. On the other hand, each potentially positive function carries with it the possibility of excess. Table II notes these associated dysfunctions. As shown, the flip side of each positive aspect of the cognitive mapping process is an undesirable extreme. Too much focus leads to tunnel vision; over-use of past experience leads to mechanistic perpetuation of past behaviour; rigid closure inhibits the flexibility required for reanalysis. The important message for managers is that the functions of cognitive maps are not clearly prescriptive. We cannot say 'take this mapping technology and incorporate it into your decision-making routine for positive results'.

HANDLING DIVERGENT BELIEFS AND OPINIONS

It is important to note that the potential functions and dysfunctions of cognitive maps relate to group as well as individual processes. To the extent

that people share a set of common maps, the contributions of cognitive mapping to collective decision processes are identical to those described above.

Of course, it is unlikely that people will share identical maps. A lack of complete agreement across individual maps opens up the possibility for another important function of cognitive maps in organizations. If collective maps partially overlap, they may provide a *basis for simultaneous unity and diversity* in group processes. Crossan's (1991) study of decision-making teams shows that cognitive complexity and diversity among team-mates, two characteristics generally believed to support superior decision-making, can be highly dysfunctional unless integration is achieved.

Interactive map making can be especially helpful in achieving this integration. Eden and his colleagues (1981) suggest that collective mapping allows groups to manage disagreements by cross-level 'absorbing'. In their work, team-level maps absorbed some of the issues of individual-level maps, while individual-level maps absorbed some of the team-level issues. Similarly, in tracing the conflictive negotiations of a new venturing team, Fiol (1991b) found that the members developed overlapping maps of the context of negotiations, while maintaining separate and non-overlapping maps of the content of their arguments. The resulting balance, she argues, provided the unified diversity needed for organized innovative action.

When a balance between unity and diversity of collective thinking is not achieved, positive map functions can easily become dysfunctional, and this dysfunctionality is exaggerated by the organizational context. To manage such a balance, managers must become more aware of the nature of the multiple maps operating in their organization.

WHAT'S IN A MAP?

Though we believe that managers need to know the potential functions (and dysfunctions) of maps, the almost exclusive research focus on this aspect of mapping prompts us to ask whether we are putting the cart before the horse. To derive the benefits of cognitive maps, and to avoid the pitfalls, managers need to know more about how to use these tools. Until we delineate more clearly the various components of cognitive maps and their interrelationships, further information on the potential functions of specific aspects of maps is not very useful to managers. Researchers and managers alike need to step back and focus on the variety of maps that are available and various uses to which these maps can be put.

Maps of the physical world might be thought of as having three important components: (1) they establish a way of designating key physical landmarks; (2) they develop scale and contour conventions that provide information about the relationships among these entities, and (3) they often include markings for routes, or alternative ways to move from one position on the map to another, given the physical terrain.

Taken as a whole, the cognitive maps available today encompass a similar set of components. However, the cartographic discipline is not as well developed for mapping the cognitive terrain as for mapping the physical

terrain. Rather than seek *one* cognitive map that encompasses all three mapping components, we believe that it is more useful, given today's knowledge, to identify and characterize mapping tools that focus on one or another of these components, and then work to manage a portfolio of map types.

In essence, our current knowledge allows us to identify 'submaps' of different aspects of cognitive processes (Huff, 1990). Three of these submaps appear to be especially useful, because they provide the same basic guidance just outlined for maps of the physical terrain. One set of submaps offers frameworks for identifying key actors, events and processes (critical features of the landscape). A second set provides information about the interrelationships of these key entities (scale, relative position). A third kind of map provides information about potential linkages among entities of importance to the organization through time (routes).

Relatively little work has explored the full range of these three mapping alternatives. In fact, as already noted, a good deal of the early research on causal thinking, which we think of as only one of three important submap types, has tended to equate causal reasoning with the total mental map of an individual. While more recent work has drawn attention to a wider set of possible map types, and expanded knowledge about the psychological constructs underlying these maps, we are not aware of mapping exercises with managers that draw upon multiple map types.

Identity Submaps

One important submap defines major features of the cognitive terrain. This kind of map, illustrated by the work of Bowman and Johnson (1991) and Dutton and Dukerich (1991), is critical to understanding the basic building blocks with which managers work. It is also critical because it provides the point of self-reference needed to utilize other submaps.

Relatively little work with managers has generated identity submaps, but the potential importance of this kind of map is underscored by the growing number of researchers who have become interested in the general topic of organizational identity. Albert and Whetten's (1985) study of universities describes identity as encompassing that which is central, distinctive, and enduring about organizations. They depict the early identity of universities – an identity that created institutions with a great deal in common with religious institutions – as governed by cultural, educational, and expressive values. The paper goes on to suggest that through identity 'drift' universities have shifted over time to resemble business organizations, governed by values of economic rationality.

Prahalad and Bettis (1986) also describe the forces that might underlie an identity submap in their study of diversified firms. They suggest that beliefs, theories, and propositions of organizational members can eventually gel into an organization-wide 'dominant logic', and that diversification decisions result not so much from the characteristics of firm assets themselves as from a variety of management logics for processing and understanding those assets.

These studies tell us that cognitions relating to identity are powerful filters through which people make sense of their surroundings. Moreover, they suggest that the forces defining identity are generally embedded in deeply-

ingrained and hidden assumptions. The crucial role of self-reference in utilizing other cognitive maps, in addition to the often implicit and hidden nature of identity submaps, leads us to argue that they are the key to managing mapping processes in organizations. We will return to this point after describing two other kinds of submaps.

Categorization Submaps

A second kind of cognitive submap focuses on managerial categorization. Cognitive psychologists have determined that categorization is a common technique for framing, structuring, and making sense of one's surroundings (Neisser, 1987), and organization researchers have explored several different ways of eliciting these judgements (see Fuller *et al.*, 1987; Gronhaug and Falkenberg, 1987; Hodgkinson and Johnson, 1987; Walton, 1986). The Porac *et al.* (1987) study given as one of our first examples describes the structural/hierarchical categories that a group of retailers use to understand their competition environment. Using a technology that focuses on oppositional logic, rather than hierarchy Reger (1990) also describes how managers use categorical thinking to identify similarities and differences among groups of competitors. Jackson and Dutton (1988) use a similar oppositional logic to suggest that the commonly-employed categories of 'threat' and 'opportunity' in strategic planning processes are important mapping devices that influence the way in which managers act on strategic issues.

All of these categorization schemes are means by which managers sort events and situations on the basis of their differences and similarities. An event or actor that appears on an identity submap takes on meaning based on the larger categories within which it is placed. When compared to cognition about identity, these cognitive activities are also often tacit, but they appear to be somewhat more accessible. They too, however, are important filters which affect managerial interpretations.

Causal and Argument Submaps

A third aspect of cognition that is frequently mapped involves causality and argument. This kind of submap provides understanding about how individuals link events occurring at a particular time to other events occurring at other times. The relational links that these submaps convey capture judgements about the link between actions and outcomes. Positions of self-reference and categorical comparisons typically serve as inputs for this judgement. One locates oneself and compares differences between alternative routes on a map, for example, as data inputs for assessing the likely outcomes of taking alternative routes. Similarly, causal and argument submaps may take identity and categorizations as inputs to assess alternative outcomes based on current inputs.

Again, previous research provides an indication of how causal and argument submaps function in organizations (see Bettman and Weitz, 1983; Fahey and Narayanan, 1986; Ford and Hegarty, 1984; Eden *et al.*, 1979; Klein and Newman, 1980; Maruyama, 1982; Ramaprasad and Poon, 1985; Roos and Hall, 1980; Salancik and Meindl, 1984; Shrivastava and Lin, 1984). All of

these studies are interested in tracing the causal linkages between givens, means, and ends illustrated in the Bougon *et al.* (1977) study.

Another example of causal mapping can be found in Hall's (1984) study of the *Saturday Evening Post*. He traced the causal assertions in managers' thinking during the rise and fall of the organization, and claimed that a critical set of causal links was neglected and led to the final demise of the firm.

Argument maps are similar to causal maps. Fletcher and Huff (1990) describe arguments used by managers at AT&T as they struggled to reformulate this firm's strategies under deregulation. The authors found that AT&T was tied to its past strategy by a set of internal logics, assumptions about the nature of the industry, technology and public service. These themes dominate organizational leaders' claims and their justifications for the links they drew between data and conclusions.

A crucial aspect of causal and argument submaps is that they go a step beyond simply identifying positions/routes and similarities or differences among them. They provide evidence of people's assumptions or assertions regarding the use of the map. Just as one may assume that a particular route on a map of the physical terrain leads to a particular destination, a similar link can be made cognitively. Causal submaps express the judgement that certain events or actions will lead to particular outcomes.

MANAGING SUBMAP RELATIONS

Taken together, the three submaps provide a tool kit for managers who must make sense of ambiguous and changing environmental stimuli. Each submap is but one of the tools. As the analogy to physical maps has repeatedly indicated, the tools are of little use if viewed separately. A 'You are here' point on a map offers little help to someone seeking directions if links to other locations are missing; conversely, comparisons between points are impossible to act on if one does not know one's initial position; and alternative routes cannot indicate possible destinations without a representation of beginning and end points.

Though all three submaps are necessary to make sense of the map as a whole, we have two reasons for arguing that managers should understand and learn to identify these separate components of mental maps in their organization. First, there is the danger that if only one map is used other submaps will be implicitly assumed and remain unquestioned. In today's changing environment, positions, routes, and projected outcomes cannot go unquestioned. This problem is especially troublesome as it relates to the identity submap.

The other reason that we argue for the importance of explicitly managing the separate submaps is that they are not equally interdependent. Returning again to maps of the physical terrain, one is able to identify one's location on a map (identity submap) without assuming causal linkages among the various routes. In contrast, the alternative ways to get from one point to another that appear on a mental map are academic unless the observer knows his or her position on the map. The usefulness of action maps depends on a 'You are

here' sign. So, though all three submaps are interdependent, they are not equally interdependent from an action perspective. Identity submaps serve as a critical grounding reference for the other two.

SUBMAP RELATIONS AS A KEY FOR ORGANIZATIONAL RENEWAL

The central challenge of developing cognitive maps in a managerial setting is to give managers a more refined set of tools with which to carry out their job. Currently very little research with normative or prescriptive implications has been carried out in the mapping area. An action orientation demands that we judge the usefulness of a cognitive map, not by a set of general predetermined functions, but rather by the question, 'What understanding is needed for effective action?'

Cognitive maps have the advantage of reflecting both highly rational and less rational thought. They can reflect inconsistent and equivocal identities and relations. Cause maps, which have been the focus of much previous work, capture the rational uses of cognitive maps, but they ignore much of the less rational content underlying patterned causal linkages.

Recent efforts to identify and understand a broader range of map types beyond causal maps will help to broaden this perspective. In particular, we believe that identity is a key element in linking rational and non-rational aspects of cognitive maps to action outcomes. Without a grounding in identity, categorization and causality submaps are purely mental exercises. They become concrete only when they are related to some sense of self. The identity submap provides that self-reference. Despite considerable research on the nature and functions of managerial maps, researchers have not yet given managers the critical message that identity is an anchor that not only gives meaning to other cognitive activities, but provides the critical basis for action.

In addition to providing a basis for action, organizational identities represent a key to opening up possibilities for strategic change and renewal. Managers need to be aware of and to manage changes in each of the submaps, but it is unlikely that all of them will change at the same rate or time. Managers need a way by which to recognize and identify which submaps are changing, and at what rate.

There is some evidence that identity submaps are the most difficult to change. Fiol's (1991b) study of managerial maps in forest products firms, when their environments were changing dramatically, found that managers very quickly became aware of the need to change their causal understanding or causal assertions. Despite this recognition, the identity submaps in several firms remained unchanged. With a fixed anchor as a self-reference, these firms were unable to act on the shifting causal relationships they recognized.

In short, we believe that identities are stickier and the hardest to change of the three kinds of submaps we have identified. One reason for this is that identities tend to be embedded in enduring assumptions, while categorical and causal beliefs are more subject to changing data inputs. Planning processes in many organizations help managers to articulate and make

explicit what their causal assumptions are, and even help to identify the categories of assessment, thereby making them more amenable to change. Identities, in contrast, tend to remain implicit and do not tend to be part of formal planning processes. Identity submaps, the keys that tie perceptions to action outcomes, thus often escape conscious identification or questioning.

Finally, a focus on identity submaps provides a way by which to articulate an organization's vision of the future. Organizational renewal demands a change, first and foremost, in its members' definition of the firm. Thomas and Gioia (1991) recently conducted a study which illustrates this point. They examined how top managers in universities interpret the ambiguous environment that characterizes modern academia. Their results suggest that institutional identities, how managers defined themselves, were critical links between key organizational contextual factors and managerial interpretation processes. Top management teams that perceived their institutions as more utilitarian tended to see the issues they faced as being more strategic, while those who were more aware of normative institutions saw the same issues as less strategic and more political in nature. A second finding that within a successful change context, expressions of identity were stated in the future tense is especially interesting. Though successful managers' self-definitions 'were cast against the backdrop of the existing tradition and culture of the university, instead of the typical expression of "this is who we are . . ." most of the expressions were couched in terms of "this is who we want to be . . ."' (p. 18). Developing and communicating a vision may depend on the ability of managers to articulate a future-oriented identity rather than an identity in the present tense.

CONCLUSION

We have argued that context maps, as opposed to strip maps, are increasingly important management tools. Simple maps that provide information about one invariate set of connected relationships have always been important, and will continue to be important for guiding routine organization tasks. Yet today, more than ever before, we need to concentrate on eliciting multiple maps that can be used as tools in managerial sense-making processes.

The various functions of cognitive maps have been fairly extensively discussed in the academic literature. Maps can help to focus attention and trigger memory. They can signal priorities and supply missing information. While these functions provide important tools for managing the decision process in organizations, each one has a dysfunctional side as well that needs to be guarded against.

In this article we suggest that information about the various functions of different maps does not give managers prescriptions about how to manage cognitive maps. In fact, any single aspect of a cognitive map, in and of itself, cannot provide any answers for managers. Answers to today's increasingly complex questions require balancing multiple and often conflicting maps.

Managers need to know how to recognize a variety of map types and how to maintain a balance among them. Identity, categorization and causality are

interactive aspects of cognition at work in organizations. Submaps designed to reveal these processes differ in their ease of recognition and in their implications for action.

A cross-balance of multiple maps is a challenge that requires an understanding of the role and differences of different submaps. It may be useful for managers to think in terms of an overlap of some of the submaps across the organization. In this way, diverse representation can be maintained, while at the same time, there is enough sharing of some submaps for communication to occur. In fact, we have argued in this article that maintaining diversity of opinion within a set of maps may be an important part of the decision input they can provide.

The key issue, then, is not to seek the benefits of any specific mapping tool, but rather to strive for a balance of mapping functions over time. The ability to recognize that there are submaps with very different characteristics and possibly different roles in the organization, and the knowledge that without understanding the identity submap none of these mapping devices can be useful for generating action, are especially important points for understanding mapping and remapping over time.

Where are we, then, in our study of managerial maps, and where do we go from here? Recent work on cognitive mapping has given us the pieces. We must begin to focus more explicitly on how managers put them together in order to act.

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