Comparing Methods for Mapping Organizational Cognition*

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Abstract

This paper presents a field study exploring the differences between two methods of mapping organizational cognition — social representation and causal mapping. After introducing the two methods and describing the mapping procedures in detail, the paper discusses the different outcomes yielded by the two methodologies. Conditions of use and intrinsic limitations of each method are then examined in the light of the results. The paper concludes with some reflections on the notion and practice of mapping organizational cognition.

Descriptors: organizational cognition, cognitive mapping, social representation

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Introduction

The cognitive approach is now a well-established line of analysis in organization studies. Its origins date back at least to the works of Chester Barnard, who emphasized that actions within organizations are closely conditioned by the way in which their members perceive the outside world, so that the environment of an organization is by necessity perceived subjectively (Barnard 1938). Although Barnard's insights had to wait many years before they were further developed into the broad range of studies carried out in the 1980s and early 1990s, interest in cognitive processes within organizations was kept very much alive by March and Simon (1958) and Cyert and March (1963), who introduced the notion of the organizational actor (and of the organization) as information-handling systems, the implicit reference being to the human cognitive system as the original model.

According to Schneider and Angelmar (1993), the recent interest in organizational cognition has developed, in particular, along the disciplinary paths of cognitive psychology and organizational behaviour. The authors suggest that a simple, and in many ways simplistic, syllogism lies behind too much of the recent interest for managerial cognition: people think, and as managers are people, managers, therefore, also think; and since these cognitive processes take place in an organizational setting, these studies may be referred to as the analysis of cognitive processes in organizations. This syllogism, however, may obscure the fundamental differences between individual and collective levels of analysis. At the same time, it may

Organization Studies
1999, 20/5
833–860

0170-8406/99
0020-0032 $3.00

identify, as the object of inquiry, the cognitive processes of individuals in an organizational setting, instead of the social process of cognition and thinking at the organizational level.

The notion that it is possible to understand organizational phenomena by using the mind and the human brain as metaphors (Morgan 1986) stimulated the development of tools for the analysis of organizational cognition. The effort to understand and describe organizational phenomena in cognitive terms led to the creation — or the borrowing from other sciences — of various methods and techniques with which to investigate the cognitive processes of members and organizations. Exhaustive surveys and analyses of these various methods have been proposed by Huff (1990), Fiol and Huff (1992), Nicolini, (1995), Walsh (1995), Strati and Nicolini (1997), Eden and Spender (1998).

Due to the uniqueness of the object under observation, constructing methods to capture and represent organizational cognition has always been especially difficult. Problems have often centred around both *validity* of method (methodological issues) and *efficacy* of the techniques proposed. In other words, the questions are about what, and how well, these methods of analysis are able to capture the sense-making processes of organizational members.

As far as validity of method is concerned, a number of scholars argue that use of an appropriate methodology makes it possible to capture and represent the mental constructs that effectively guide actors in their everyday behaviour (Huff 1990; Fiol and Huff 1992; Walsh 1995). According to these scholars, both individuals and organizations process information from the environment using some form of knowledge structure, that is 'a mental template that individuals impose on an information to give it form and meaning' (Walsh 1995: 281). Hence the study of the links and indebtedness of organizational cognition to cognitive psychology and artificial intelligence (AI), which bases its research on this premise and from which not only its implicit assumptions have been borrowed, but also mapping and representation tools.

The intuition that underpins mainstream cognitive science and AI is that in its essential features, intelligence — which includes human intelligence — so closely resembles an information processor, that cognition can, in fact, be defined as the computation of symbolic representations (Varela et al. 1991; Strati and Nicolini 1997). Symbolic representations and mental structures therefore play a pivotal role in the whole approach: together, they encapsulate a complex phenomenon; a process which, on the one hand, draws upon, and on the other reconstructs and gives order to, independent elements found in an external environment with pre-established characteristics. At the same time, symbolic representations and mental structures play a mediating role between stimulus and response, so that the aim of the approach is to assign causal properties to people's desiderata, convictions and volition; that is to say, to establish whether they are representative or above all intentional, physically possible, and capable of generating behaviour. Accordingly, it is legitimate — and indeed necessary — to posit

a separate level of analysis and of entities which may be called the level of 'representation', because this level is necessary to explain the variety of human behaviour, thought and action (Gardner 1985). When a scientist works at this level, s/he is dealing with representative entities such as knowledge structures, symbols, rules and images — the matter of the representation which lies midway between input and output. The task becomes that of mapping the pattern of these representations as well as surfacing or exploring the ways in which these representative entities are united, transformed or contrasted.

There are, however, a small number of scholars who have raised doubts about the possibility of mapping organizational cognitive structures. Narayan and Fahey (1990), for example, suggest that the correlation between 'true' and revealed causal maps is never perfect and is shaped by the nature of the public discourse and the context in which it takes place. In other words, the nature of the context of disclosure and the presence of a good reason for concealing the content of the map, such as, for example, a highly competitive situation, may interfere with the researcher's effort to determine the nature of 'the lenses that filter data and constitute the means by which data are interpreted' (ibid:111).

Positions such as the one just described reveal that the questions about validity and veridicality of the rendition of mental representations, instead of producing a divide between those who assert that mental structures are accessible to external inquiry and those who doubt it, may constitute a fundamental dimension of agreement between the two. Both approaches, in fact, posit a distinction between information environment, knowledge structure and information processors, either individual or collective, thus subscribing, albeit implicitly, to the dualist idea of a distinction between world and mind, which, after all, is a necessary premise for claiming the mediating role of mental structure. In other words, they both subscribe to the existence of mental structures, although for some authors access to such structures is somewhat problematic.

There is, finally, a group of authors who adopt a more cautious ontological and epistemic stance toward the whole issue of mapping organizational cognition. Axelrod, one of the pioneers of causal maps, while apparently not disregarding the possible existence of group knowledge structures, excluded from the outset the possibility of capturing the thought processes of organizational actors by means of analytical tools. According to the author, the term 'cognitive' in the expression 'cognitive maps' should not mislead us; maps are by no means able to produce inferences regarding what organizational decision makers or actors actually believe; they merely give order and graphic representation to their overt statements (Axelrod 1976).

A similar position has been taken up more recently by Eden (1988, 1992) and Cossette and Audet (1992). They point out that the claim that any different types of cognitive maps have an ability to describe, simulate, or predict thinking is problematic. Cognitive maps are representations of representations, and therefore they cannot be claimed to capture 'what is

in the mind of the organizational actor'; thought processes and discourse structure interact and interfere with one another, especially in the presence of a particular representative methodology and of a researcher who gives specific configuration to the context in which the cognitive map is constructed. Maps should therefore be regarded only as instruments of depiction and representation which aid the discussion and analysis of certain modes of thought and explanation of events. Nevertheless, maps are extremely useful, because the opportunities they afford to produce, and interact with, a description of the ways in which certain classes of phenomena are interpreted become the basis for a self-reflection experience which produces learning and change. The present paper will build on similar critical and non-realist epistemic premises, although in our case they derive from the adoption of a post-positivist approach to the study of organizing processes (Cooper and Law 1995; Chia 1996).

Methods for mapping organizational cognition, as for any other representational system and ordering strategy, do not limit themselves to codifying the reality 'out there' in terms of facts, objects and events, but construct these elements of the reality they describe by highlighting certain aspects and concealing or contrasting others.

Our purpose here, therefore, is not that of validating and refuting the existence of maps or representations as much as exploring to what extent (some) methods for mapping organizational cognition help us deepen our understanding of the cognitive and ideational dimension of the organizing process by 'creating' meaningful and relevant descriptions and renditions.

Because methodologies are 'dispositives' for seeing and for not seeing, our interest here is in investigating what different methods allow us to see, their capacity to provide relevant descriptions of the cognitive aspects of the processes of organizing, and the balance between what these methodologies highlight and conceal as well as identifying the compromises, ambiguities and contradictions that these methods have to sustain in order to produce their representation of reality.

One may note here that the structure of the present paper testifies to a progressive theoretical transition brought to bear by the reflexive act of telling and re-telling the 'data' in the process of writing. As clearly spelled out in the next section, the original aim of the research was simply to 'road test' and compare two methods for mapping organizational cognition. In this sense, the original research design was still bearing traces of what we may call 'second generation realism', a problem which we share with many other authors in this and other areas of organization studies.

In fact, much of the existing literature on cognitive methods of organizational analysis is affected by what Steve Woolgar calls the 'splitting and inversion model of discovery' (1988). According to this perspective, the representationalist and modernist project of science and knowledge is based on an institutionalized process of forgetting. In the beginning, notions used to speculate about the world from the legitimate focus of investigative work. However, the 'objects' created by these speculations very quickly assumed a life of their own. If sufficient social support has been mobilized, the exis-

tence of the (new) object becomes 'natural' because it has been institutionalized (Douglas 1986). This produces an inversion, giving the impression that the fact itself triggered the original researcher's interest and not *vice versa*. Scholars and researchers of the second generation, forgetful or subordinate to those who produce 'knowledge', or decentralized or marginal to them, are therefore legitimated in thinking of the new object as a 'fact' and in arming themselves with questionnaires, measuring scales and other scientific tools, before setting off to verify the distinctive features of this 'fact'.

The impossibility of discussing 'things' such as a collective mind, mental structures, maps and representations separate from the theory and practices necessary to 'bring them to life', became more and more apparent during the writing process, in view of some of the research results. As a consequence, the author embraced a more coherent non-realist approach and started to question some of the assumptions implicit in the methods selected for comparison. This resulted in the discussion on the intrinsic weaknesses of maps as diagnostic devices to be found in the final section of this paper.

Testing Cognitive Methods in the Field

The Aims of the Research

This study was prompted by the researchers' interest to 'road test' two different cognitive analysis methodologies with the intention of highlighting their differences and observing and understanding both consequences deriving from the diversity of each approach and (possibly) differing efficacy in shedding light on the cognitive aspects of the organizing process. To this end, the research design provided for participants to express their own opinions on the diversities of the descriptions produced. The work is, therefore, an example of qualitative research to compare two different methodologies in action within the cognitive analysis of an organization field.

The Methodologies Used

The research was designed to identify two cognitive methodologies of organizational analysis that were sufficiently different as regards the research tradition in which they were created, their methods of data gathering and processing, and the manner in which they represented their results. We also wanted two methods supported by a sufficient level of epistemological sophistication: many of the methodologies put forward for mapping organizational cognition are often weak and quite rudimentary, with a frail theoretical background. Whilst substantial effort has been put into the development of sophisticated computing and comparing techniques (Markóczy and Golberg 1995; Laukkanen 1998), less attention has been devoted to the specificity of the object of analysis, so that researchers have occasionally neglected specific issues related to eliciting cognitive processes.

In other words, we were looking for approaches that paid sufficient attention to the development of adequate methods of inquiry appropriate to the particular object of analysis — i.e. sense-making processes and the processes of organizational thinking. Finally, we were looking for methods that were at least in part attuned to our personal constructivist agenda and our bias for qualitative research. The latter criteria, of course, restricted the choice of approaches and reduced their span of divergence.

Our choice fell on causal maps constructed according to the theoretical indications of Michel Bougon (1983, 1986, 1992; Bougon et al. 1990), and on social representations as theorized by French social psychologist Serge Moscovici and his associates (Moscovici 1969, 1981; Farr and Moscovici 1984; Abric 1984; Di Giacomo 1985; Farr 1987, 1993; Jodelet 1991), which appeared to meet our requirements. The former is based on a cycle of self interviews and combines, in a non-traditional way, elements of cognitive psychology with concepts derived from phenomenology, cybernetics and system theory (Bougon 1992); the latter comprises the quantitative analysis of textual data gathered by open-ended interviews and stems from the tradition of French social psychology and Durkhemian sociology; the former openly accepts the notion of individual schemata while the latter aspires to resist the individualistic reductionism common elsewhere in social psychology (McKinlay and Potter 1987); one is focused on capturing interrelated patterns of individual perception, the other strives to elicit the form, content and function of collective ideational processes which are generated in, but are not reducible to, communication and dialogue between individuals (Moscovici 1985). The two approaches will be described in brief later.

The Setting

The research was carried out in an Italian factory of a leading multinational company in the electrical engineering sector, renamed here 'Electra'. The factory is situated in the north of Italy and is part of a network of plants located in every part of the country. It employs a workforce of 500 people.

The General Design

Initially, the 18 subjects participating in the research were divided into three groups, homogeneous in composition and characteristics (at least 10 years' length of service, parity of roles, high school education). The interviewees, all volunteers, represented the entire range of middle management (all the middle managers of the firm participated in the experiment). The aims of the research were explained to all members of the groups ('we are going to compare two techniques aimed at representing certain aspects of the organization'), and the purely academic scope of the study was stressed. However, only two of the groups constructed the maps, working separately and each using one method only. The third group functioned as a discussion group and only participated in the last meeting where the two maps were displayed and discussed.

The two groups who worked to elicit the cognitive map and the social representation received the same input. In the attempt to elicit the fundamental categories used by members of the organization for making sense of the organizing processes and the premises on which their action was based, participants were asked the question 'What characteristics are required for one to feel part of the Electra people, that is, to be approved and accepted and successful in one's work?' Participants then responded according to the procedure established by the respective methodologies.

At the end of the initial phase, the representation obtained was shown to the members of the group that produced it; members were asked to complete a short questionnaire concerning their degree of satisfaction with the map they produced, and their level of self-recognition. Subsequently, all three groups were invited to a plenary session at which the maps obtained using the two different methodologies were presented, and at which they were asked to express their opinion on the perceived differences between the representations.

The Research

The Construction of Social Representation (Method 1)

The first method applied allows the construction of social representation on the basis of textual data gathered from open-ended interviews conducted individually with each participant, with the researcher in the role of interviewer.

The basic premise of this method is the notion of social representation, introduced in the early sixties by the French social psychologist Serge Moscovici. Moscovici argued for the existence of socially determined universes of opinion — i.e. social representations — which operate at both the cognitive level, in that they propose consensually validated symbolic expressions of social relationships, and at the behavioural level in that they help orient and direct collective action (Moscovici 1969, 1981, 1984; Farr 1987).

According to Moscovici, social representations are a cognitive system at the social level which enable reality to be grasped and organized. By means of communication, individuals and groups confer a physical reality on ideas and images, on systems of classification and denomination. In short, social representations can be defined as the elaboration of an object by a community which enables its members to behave in a comprehensible manner and to communicate. They are cognitive systems with a logic and language allowing the members of a community to organize the conditions and contexts of their interactions. On the one hand, social representations allow individuals and groups to construct a coherent vision of reality, which they use to orient their behaviour. On the other, they are the outcome of mental activity modulated by the features of the social situation in which they are produced (Gherardi 1998).

According to some authors, social representations articulate around a central nucleus surrounded by peripheral elements (Abric 1984; Di Giacomo 1985; Farr 1993). The central nucleus, which consists of the attitudinal component, can be called the 'site of coherence'. It is the chief organizer of the representation, the discriminating element with respect to which all the representative elements are organized and endowed with meaning. Given these characteristics, the central nucleus is the most stable part of a social representation, 'that is, the one most opposed to change' (Abric 1984: 213).

The network of meanings attributed to a representation gives rise to a 'field of representation'. This is an outright 'map' which restores the object of the representation reconstructed according to the nature, needs and beliefs of the group of individuals whose interest it has aroused. The particular configuration of the field evidences the coherence of the field of representation via the evaluation and selection of the information gathered about the object represented.

Eliciting Social Representations

According to the authors who first introduced the notion, the best way to identify social representations is to conduct some sort of analysis of the content of written/oral texts (Farr and Moscovici 1984). In fact, this is the method usually employed to identify social representations in the French tradition.

In our study, we used a quantitative technique for text analysis, known as 'analysis of similarity' (*analise de similitude*) based on the computing of co-occurrence in textual data (Degenne and Verges 1973).

The 'analysis of similarity' is a quantitative technique by which it is possible to single out the significant relations among the parts of a whole. Introduced by Claude Flament to the study of social representations, the 'analysis of similarity' is based on the fundamental assumption that two themes are cognate if subjects use them together. The technique, therefore, measures the co-occurrence between elements of text and represents results in a graph plotted from the relations linking pairs of variables. Although the 'analysis of similarity' is capable of capturing only one dimension of the complex relations within the social representation, it has often been used for this purpose, as it offers the advantage of not requiring any 'strong' preliminary hypothesis on the nature of the relations between elements (Flament 1981).

Data were gathered using open interviews on individuals. The researcher proposed the initial input question (see above) used for all members of the two groups, then supported the eliciting process by formulating general open questions. All interviews were taped, transcribed, and codified by the researchers on the basis of a number of dimensions of interest relative to the theme of analysis. In the next phase, similar codes used by the interviewees to refer to the same dimension were abstracted, synthesized and categorized.

It was now possible to progress to the quantitative elaboration phase. As

well as calculating absolute frequency of categories, thereby revealing the number of times the empirical indicators appeared, we analyzed the co-occurrence of different categories. Examination of the co-presence of indicators in individual interviews yielded co-occurrence indices, enabling significant relations among variables to be described. The result is a hierarchical tree of relations (the 'maximum tree') of differing indices of co-occurrence between categories. The maximum tree can be 'dis-entangled' into a graphic representation (see Figure 1) indicating both the level of co-occurrence between categories and their frequency in the interviews. The frequency of appearance of categories during interview is represented by the diminishing size of the circles. The strength of the co-occurrence index is represented by the thickness of the lines connecting categories. When combining the two criteria and arranging the most frequently occurring *and* most closely connected categories at the centre, the social representation nucleus becomes immediately apparent.

The diagram (overleaf) shows that the social representation of the characteristics required 'to feel oneself part of the Electra people, that is, to be approved and accepted and successful in one's work' is mainly organized around a solid nucleus of categories coupling pride with operational skills. All five of the most frequent and tightly related categories refer, in fact, to dimensions of the 'doing': to be approved and accepted in the firm one has to 'know how to do'(10), exhibit behavioural (11) and 'instrumental skills' (9: computeracy, foreign languages), be operational (3) and show pride in being a member of the firm (1). One may suggest that the nucleus of the social representation of acceptance revolves around the notion of membership and dedication through competent action. This is, after all, not so surprising in view of the fact that the interviewees were middle managers in a well-established manufacturing firm with a long tradition and history. Just below this, the lower-order constellations which have strong links with the core confirm and reinforce this association of contents: becoming a leader requires knowledge of how to be operational (3), but belief in the firm is also required (4); the knowledge required should concern both individual and group behaviour (5), and non-acceptance of company characteristics is a strong factor of disapproval (23). Note however, the element of chance involved (14).

The graph also conveys information on the missing or weak relationships that it displays.

For example, it is notable that 'becoming the company' (31), meaning accepting the corporate ideology, is linked with (3) 'being operational' (a very pragmatic way of looking at things indeed!) but not, for example, with 'pride in being a member of the firm' (1).

At the same time, while the categories which, in a sense, qualify the notion of behavioural skills [upper left part of the figure: (32,15,7) and constellation (8,18,15,29,35)] all rotate around the notion of 'making everybody responsible'(32), these are not significantly related to other important dimensions of corporate policy (lower right part of the map) such as a flattening hierarchy (30) and even teamwork (34 and its constellation). In fact,

Figure 1
Areas of Investigation and Related Categories Used by Respondents

A. Being corporate people

1. Pride of being a member of the corporation.
2. Training opportunities.
3. Being operational people.
4. Believing in the company.
5. Team work (collaboration).
6. Believing in one's own job, in what he/she's doing.
7. Being moderate, self control.
8. Feeling for the customer.

B. Characteristics needed for success

9. Instrumental skills (languages, computeracy).
10. Know-how.
11. Behavioural skills (talent for leadership, international, open, and collaborative att.).
12. Availability (time, relocation).
13. Creativity, enterpreneurship.
14. Sympathy, luck.
15. Being open to change.

C. Condition for approval

16. Being.
17. Being open to relocation.
18. By chance
19. Hitting your target.
20. Training, being updated.
21. Changing mentality.

D. Conditions for disapproval

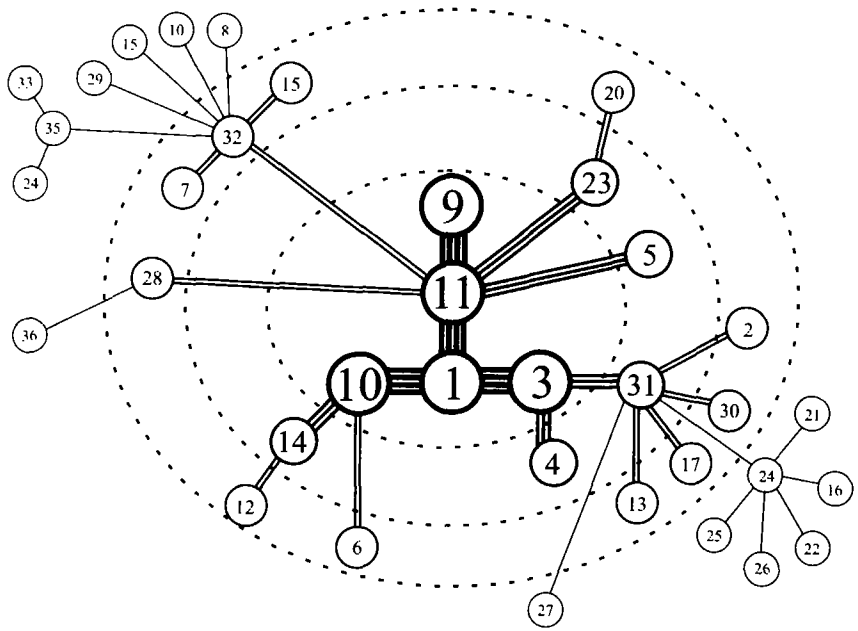
22. Clashing with the boss.
23. Not changing mentality.
24. Not reaching your targets.

E. A good result

25. Corporate satisfaction.
26. Employee's satisfaction.
27. Customer satisfaction.
28. Reaching the goals.
29. A good relationship with collaborators.

F. Corporate policy

30. Flattening hierarchy.
31. Becoming the company.
32. Making everybody responsible.
33. Control.
34. Team work.
35. Laying off goals.
36. Increasing productivity.



Thickness of the line= intensity of the link (degree of co-occurrence)
Position in the diagram = centrality of the notion in the social representation

the impression is that respondents distinguish and differentiate between what they see as typical line manager behavioural skills (upper part of the map: being moderate (7), maintaining good relationships with collaborators (19), meeting targets (28), customer oriented (8), controlling and dismissing those who do not reach their targets (33, 33, 24) and corporate policy 'catchwords' [lower right: teamwork (34), corporate and customer satisfaction (25, 26), creativity (13), flat hierarchy (30)].

In a sense, the social representation suggests that interviewees tend to distinguish between appurtenance to the firm and to the company. This may be partly explained by the fact that the research was carried out in the period following the acquisition of the previously European-owned firm by a North American multinational. This had brought perceptible changes in management style, with a series of cultural initiatives (such as vision enhancement, tests on the organizational climate, total quality promotion) the effects of which emerged during the research. Signs of concerns raised by the transition appear in the form of an insistent reference, in the map, to change as a success factor within the firm (changing mentality, being open to change, not changing mentality). However, the insistence on relocation as a success factor suggests that people at Electra perceive it as a microcosm with a set identity and reduced possibilities for success and career advancement. In a sense, the message is: 'if you want to be accepted here work hard and well, but if you want to become successful "become the company" and move on'.

The Construction of Cognitive Maps Using the Self Q Test (Method 2)

The 'Self Q Test' is a sophisticated step-by-step technique developed by Michael Bougon to plot individual and organizational causal maps. It is based on the combination of self-interviews with a number of structured activities in order to identify a network of concepts connected by causal relations (causal map) without requiring the interviewee to generate a complete, abstract representation (Bougon 1983; Weick and Bougon 1986; Bougon et al. 1990; Bougon 1992).

The Self Q methodology seeks to circumvent the problems of researcher access and influence which place major limitations on the validity of the 'data' used to construct causal maps. The 'Self Q Test', its inventor claims, is non-directive and non-reactive, because it transfers much of the responsibility for the organization, execution and validation of data-gathering and map construction from the interviewer to the interviewee. This should help rather than hinder the collection of significant information. The method is also based on the creation of a self-exploratory 'setting' which helps to forestall the tendency of actors to repeat, even individually and privately, the theories proclaimed at official levels in their organizations. Bougon declares that due to certain features (minimization of interference, high level of feedback, use of the organizational actors' own expressions and language), the 'Self Q Test' is the cognitive technique that most closely resembles sophisticated ethnographic methods of data-gathering.

In following up research previously conducted with Weick and others (Bougon et al. 1977; Weick and Bougon 1986), Bougon has flanked the 'Self Q Test' with a theory on the connection between individual and collective causal maps. A causal map is a particular form of cognitive map, comprising a set of concepts connected by causal relations. As a form of representation, causal maps consist of networks of concepts linked by logic-causal operators.

Eliciting Individual Causal Maps Using the Self Q Test

The construction of cognitive maps was a specific area of interest for this research study. The present work is one of the first (and few) cases of the literal application of the methodology introduced by Bougon et al. in 1977 and subsequently developed, both methodologically and theoretically, by Bougon. It represents, therefore, a sort of validation by repetition, made even more stimulating by Eden's (1992) observation, already mentioned, that cognitive mapping using the Self Q Test is one of the few complete and mature methodologies developed to date. In view of this situation, great care was taken to adhere as closely as possible to the indications provided by Bougon (although, as we shall shortly see, this was not always possible). More specifically, in constructing the individual cognitive maps, the procedures set out in Bougon et al. (1990) were applied.

During the first interview (conducted on an individual basis), in a non-directive manner, concepts and notions were gathered. Interviews proceeded in anomalous fashion because researchers asked the interviewee to formulate his/her own questions on the topic under examination, hence the name of the methodology. Once the questions were transformed by the researcher into concepts and notions (preserving, however, the original wording), interviewees were asked to establish the causal links between concepts, using a simple cross-referencing system. In practice, the participants were asked to indicate which notions influenced others, whether positively or negatively, and to what extent (little, quite a lot, or considerably). On the basis of these data, the researchers drew up individual maps for each of the participants. Adjacency matrices were constructed and then, by successive multiplication, the reachability matrices between concepts were identified. Concepts were thus ordered according to their in-degree level (arrival connections, i.e. influences undergone) and out-degree level (departure connections, i.e. influences on the other nodes in the map). According to the theory propounded by Bougon et al. (1977), concept nodes with a high level of in-degree level should be interpreted as describing the goal of the action described by the other nodes. This made it possible to order the nodes according to a hammock-shaped scheme (etiogram) in which the causal factors or presuppositions lie on the left, the means towards the centre, and the effects or goals on the right.

From Individual to Collective Causal Maps: Cryptic Nodes and Synonymy

Bougon (Bougon et al. 1990) claims that individual cognitive maps are indeed connected and that they do constitute a single underlying cognitive

structure responsible for the organization and strategies of action of any social system. This shared map, however, is highly dynamic and is constantly enacted and re-negotiated in action. Moreover, the shared map is based on a small number of connections between individual maps. Accord is not produced at a deep level among the cognitive maps of organizational members; only superficial elements known as 'label-expressions' (in the sense of the label on a tin) are involved, left deliberately cryptic to enable concerned parties to interpret them opportunistically. Bougon, therefore, maintains a strong, linguistic-based constructionist perspective on organizational phenomena: organizing activities are not based on, and do not give rise to, shared meanings. At the heart of organizing phenomena lie the never-ending processes of meaning negotiation, based on label expressions. The cryptic concepts (i.e. the label expressions) thus provide both the material for everyday organizing activities and, in our case, the building blocks with which collective maps can be constructed on the basis of individual ones.

However, constructing collective causal maps on the basis of Bougon's theory and methodology encounters various problems and raises issues. As already mentioned, Bougon, after exploring and discarding various 'empirical' methods for the construction of collective maps[1] on the basis of individual ones, introduced the idea of cryptic labels (cryptic nodes) as the guiding theory and practice for the construction of (congregate) collective maps of social systems.

The cryptic nodes in a map correspond to those assertions which, internally to the social system, 'glue' organizational processes together by enabling members with different goals to co-ordinate their action in order to achieve mutually advantageous outcomes. Consequently, these label notions must remain partially indefinite or non-interpreted, that is, cryptic. Only thus does it become possible to act jointly, despite the presence of conflicting ways of viewing and constructing both the world and the results of action (Weick 1979a, 1979b; Bougon 1992). The cryptic nodes are the points at which the cognitive maps connect, and at which the co-ordinated action constituting the organizational process therefore becomes possible.

The problem is how to identify these nodes. Unlike the case of individual causal maps, Bougon's indications are of little help here because they are vitiated by circular reasoning. He defines cryptic nodes as those which unite the individual maps, but when giving operational instructions on how to identify them, he does no more than state that '... the nodes that unify the individual maps are the cryptic nodes' (Bougon 1992: 382).

The solutions proposed by Bougon for the elimination of this awkward tautology belie the previously described quasi-ethnographic and non-intrusive approach. On the one hand, in fact, he suggests that the researcher should search for possible 'key informants' within the organization; that is, those of its members conversant with the most significant issues and who may be termed 'cryptic'; on the other, he advises suggesting to them a number of very general questions — 'industry recipes' (Spender 1989) — which, because they are widely accepted, may be useful references as cryptic

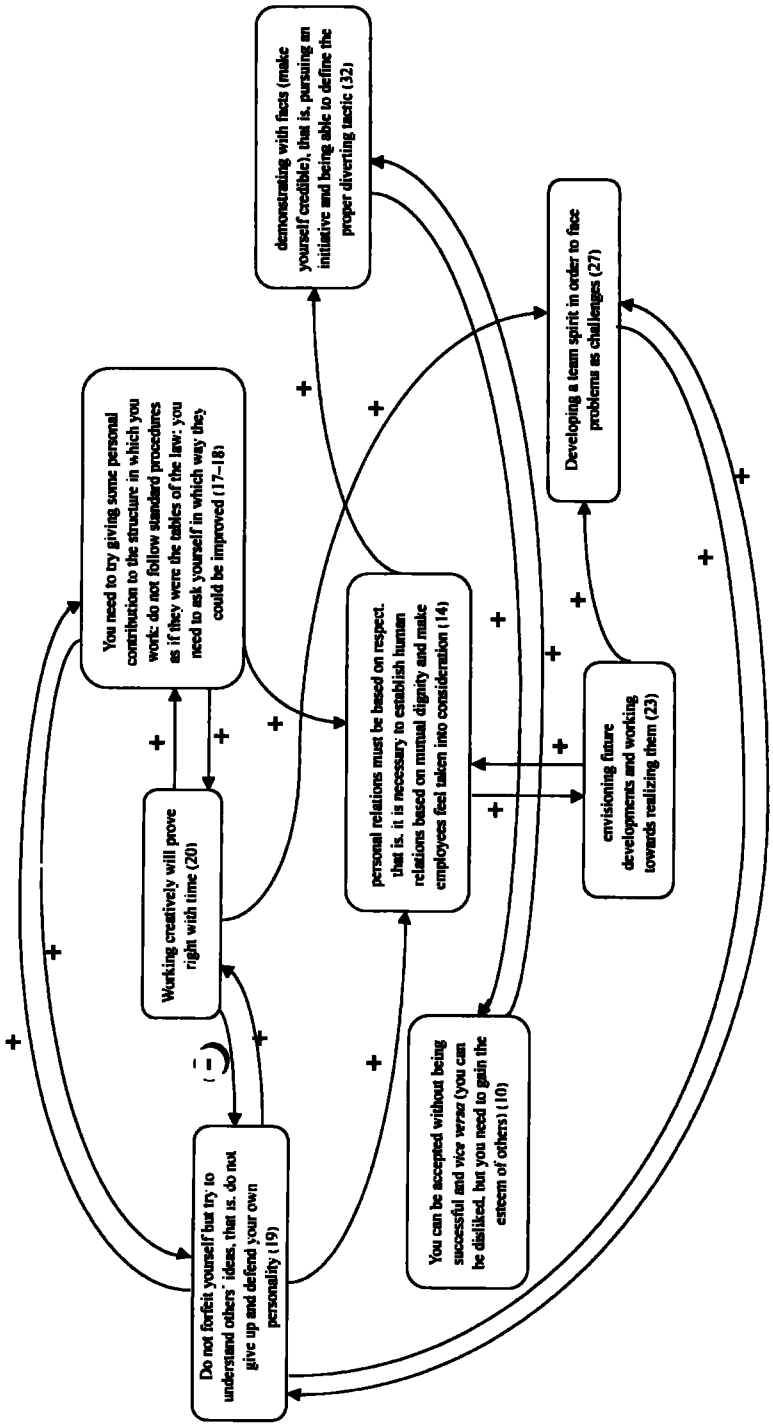
nodes. However, these suggestions do introduce a marked degree of methodological confusion and interference by the researcher. To prevent this, we adopted a methodology for identifying the cryptic nodes coherent with the non-intrusive approach of the previous (individual) stage. Our reasoning was as follows:

If members of the system recognize themselves in certain label statements, there must be at least one convergence on them in the synonymous judgements of actors. That is to say, at least at the linguistic level, there must be some 'soft' form of agreement, although this does necessarily mean that such agreement also extends to the way in which these statements are understood and interpreted. Members of the organization must therefore acknowledge that their expressions are 'similar to', 'relatable to' and sometimes 'substitutable with' those of others, although this similarity may not resist deeper interpretative analysis. It is therefore possible to identify the cryptic nodes by asking the actors to search among the nodes of other actors' maps for the label expressions that they consider to be synonymous with their own. The most frequently selected statements are those recognized as reflecting the expressions of many of the actors, and they may be regarded as the points at which the actor's own map overlaps with those of others. In order to identify the cryptic nodes, therefore, one proceeds by *individually asking the actors themselves* to indicate which of the statements made by other actors are substitutable (synonymous) with their own.

In contrast to the researchers' expectations, while actor A considered one of his/her descriptions to be synonymous with one of actor B's, the latter considered his statement to be synonymous with C's, and so on. That is, the request did not produce a series of two-way correspondences, but a chain of synonymy which led from one label node to one or several others, i.e. to a further network which constituted the map of the 'circulation' of the synonyms. Since the actors work individually and without interacting, it is unlikely that nodes will emerge that every actor will recognize as synonymous with their own and which, therefore, will certainly be cryptic nodes.

In the spirit of Bougon's work, the cryptic nodes in the collective map were identified by means of the same procedure used to construct the individual causal maps, deliberately avoiding open interaction between the participants. By applying the criterion according to which the nodes receiving the largest number of synonyms may be considered to be those which best summarize the meaning of all the others and which are therefore most likely to constitute cryptic nodes, the in-degree level of the various nodes was once again calculated in order to construct a hierarchy of nodes in descending order of 'crypticality'. The most cryptic nodes were those with the highest in-degree of synonymy, because they best summed up the characteristics under investigation. The cryptic nodes were used to construct the collective cognitive map: the most cryptic nodes were placed in the same positions allocated to them by interviewees in their individual maps, and links among nodes were transposed from individual maps. The collective cognitive map created from the cryptic nodes identified by means of the above methodology is shown in Figure 2.

Figure 2


demonstrating with facts (make yourself credible), that is, pursuing an initiative and being able to define the proper diverting tactic (32)
You need to try giving some personal contribution to the structure in which you work: do not follow standard procedures as if they were the tables of the law; you need to ask yourself in which way they could be improved (17–18)
Developing a team spirit in order to face problems as challenges (27)
personal relations must be based on respect, that is, it is necessary to establish human relations based on mutual dignity and make employees feel taken into consideration (14)
Working creatively will prove right with time (20)
envisioning future developments and working towards realizing them (23)
You can be accepted without being successful and *vice versa* (you can be disliked, but you need to gain the esteem of others) (10)
Do not forfeit yourself but try to understand others' ideas, that is, do not give up and defend your own personality (19)

The causal map representing the characteristics required for peer-group acceptance pivots on notions of dignity, respect and good relations (not only does this node occupy a central position in the map, it is also the most cryptic node, i.e. the most widely-shared notion). Assertiveness and self-respect are perceived as a point of departure, while 'demonstrating with facts' is presumably perceived as an objective to work towards. Also worth noting are the numerous plus signs, which indicate amplifying loops, i.e. chain reactions in which each factor causally amplifies all the others. This feature can be readily explained, since the map is made up of 'positive' nodes. The only loop that tends to stabilize itself is also positive (19→17 – 18→20→19: not forfeiting oneself helps one to make a personal contribution, which bears out the fact that working creatively will prove right with time, which in itself reduces the need for self-defense and enhances non-self-renunciation...).

Feedback from the Participants

On conclusion of the research, about three months after the interviews, the two representations were presented to all the interviewees and discussed. The two diagrams were returned to the interviewees, who were asked to assess, on a scale from one to five, the extent to which the map managed to capture the characteristics indicated in the initial input. Both members of the group generating the social representation and the causal map claimed to be quite satisfied with the capacity of the charts to represent what they had said. Members of the group generating the social representation assigned an average score of 4 (std. dev. 0) to their degree of satisfaction with the results of the map. The causal map constructed using the 10 most cryptic nodes produced an average level of satisfaction equal to 4.3 (std. dev. 0.44).

This was the first opportunity for members of groups 1 and 2 to examine each other's results, while both representations were presented to the third group for the first time. All participants were asked to complete a short questionnaire designed to bring out any major differences between the two representations.

Approximately half the participants stated that they did not perceive major differences between the two representations. The same statistic applied to all three groups — in fact, the control group were split by exactly half on the matter.

Most of those who discerned substantial differences provided the following reasons for doing so:

1. The causal map gave greater emphasis to emotional aspects (feeling at ease) and provided a better description of features to do with the size of the group and the sense of belonging. It was also more oriented towards the ideal dimension (what we would like to be) and adhered more closely to the language of what the company ought to be.

2. The description of the social representations captured everyday reality better, but more 'coldly'. It was therefore a more accurate portrayal of

everyday life and concerns than the other representation. Both methods, however, yielded a general picture which was not effectively specific to the organization that they represented; they therefore tended to be general and somewhat generic.

3. Both representations strongly reflected themes and notions promoted by the company, i.e. they corresponded to the corporate 'vision'. Both representations therefore conveyed a version of reality which adhered to the official one.

4. Finally, the diagram used to depict the results of the analysis of the social representations was more schematic, and therefore easier to consult and understand than the causal map 'box and arrows' chart. However, it was less rich in information and less vivid (because of the 'technical' manner in which the nodes were formulated).

Discussion

The initial aim of the present research study was to show the differences between the two cognitive methods of organizational analysis, regarding their capacity to provide a 'deep' and relevant description of cognitive and thinking processes in the organization.

It was an assumption of the researchers that the two approaches differed both theoretically and methodologically: one stems from a combination of psychology and cybernetics and is based on a cycle of self interviews; the other is rooted in the tradition of French social psychology and sociology and is based on the analysis of textual data gathered by open-ended interviews.

The two representations, in fact, paint quite different pictures of the ways in which group members make sense of their own being in the organization. This was confirmed by the participants who, as we have seen, recognized the differences between results obtained by each method, but noted that these differences became less relevant because of the generality of description and adherence to the official corporate language of accountability.

The social representation suggests that this group of managers perceives the identity of the firm as being partially separate from that of the corporation and associates their sense of appurtenance and pride more with the former than the latter. This identity, which defines the local 'culture' of being at work, is very much pragmatically oriented and strongly based on practices and 'doing'. Such pragmatism includes the awareness that to succeed one has to reach a pact with corporate policy, expectations and terms of accountability. The representation seems to indicate that approval and success are perceived as being different because they refer to different social spheres.

This last point is also alluded to in the causal map, the focus of which, however, is quite different. The causal map tells us a story of interpersonal relations from which conflict and politics are completely absent. The map has

an overall positive and 'aspirational' overtone. Using a person-centred vocabulary, it focuses especially on the needs and feelings deemed necessary to establish or maintain amicable and harmonious human relations in the workplace. According to the causal map, respect, dignity and mutual consideration, as opposed to practice and operationality, constitute the pivot of the sense of appurtenance. Most strikingly, most of the nodes in the causal map retain an individual perspective — many of them are in fact framed as individually oriented prescription in the form of 'you shall...'.

Whilst the social representation offers a broader and more meaningful overview of the category of social inclusion and acceptance, the Self Q Test managed to capture 'hotter' cognitive elements, mainly as a result of the setting created by the self-interview and of the opportunities provided for the interviewees to make repeated comparisons with the results of their reflections. However, the inward focus created by the person-centred interview, as well as the non-interactive procedure to derive a congregate map prescribed by the methodology, combine to produce a rendition that looks more like an individual map widely acceptable within the group than a description of collective processes. One of the reasons for this outcome derives from an apparent contradiction between the theory and the methodology propounded by Bougon.

Although Bougon and his colleagues indicate that cognitive maps are dynamic and subject to a continuous process of negotiation and change, what we really produced following their methodology was just a snapshot of the circulation of meanings within the group. The circulation, of which we saw only the initial 'frame', will only develop and find points of equilibrium through the conversation and negotiation of meaning which takes place within the socio-affective and political dynamics of the system (Walsh and Fahey 1986). Had the participants been allowed to interact, the chain of synonyms would have been rapidly transformed into the kind of close-ended discussion typical of the organizations to which we belong on a daily basis. The shared map, if there is one, would be the result of a social process that the methodology explicitly excludes. Moreover, mapping the process of negotiation would provide data that are as significant as the map itself. In this case, however, we would end up with something different from a map, probably with a nice story. Because sense making is always sense-in-the-making — and Bougon also seems to agree (Bougon et al. 1990) — we must therefore recognize that even the most sophisticated cognitive mapping methods can only provide a poor representation of the process of organizing, in that it lacks the instruments for rendering the dynamic, negotiated dimension of organizational life.[2]

The Self Q method would therefore be better considered and used as a low-intrusive tool for investigating cognitive and affective processes of the organization, with a view to subsequent joint reflection on them. Because of the individual involvement and active role in the construction of the individual maps, it may constitute a powerful input in activities of group development and consensus building. However, because of its incapacity to overcome the individual bias built into its methodological premises, and

because of the level of involvement and energy required by each of the participants, it is less suitable for capturing broader processes of collective sense making.

It must be noted, however, that the structure of the research itself prevented a sharp distinction between the efficacy of the information-gathering method and the form of the representation. Assessments of the method were therefore ambiguous, because they addressed two elements simultaneously. There is a suspicion that the results of the study tell us more about the emotional tonality conveyed by the graphic representation (the cause map has words, the social representation only numbers) than the mapping techniques.

This consideration provides a useful indication for those willing to use cognitive mapping. The choice of an appropriate graphical method of representing it constitutes a critical aspect of research, especially since the research design includes feeding back results to participants. Causal maps, albeit very rich in content and revealing to researchers, can be baffling to those unfamiliar with the network representational codes. At least in our case, according to some of the participants' comments, part of the explanatory power of the causal map was lost due to difficulty in perceiving the meaning of the arrows and differences implicit in nodal positions.

Taking into account the fundamental negotiated nature of meaning in organization helps us to understand the level of generality (almost triviality) of the statements contained in both maps and promptly indicated by participants.

The fact that the maps were very general may well derive from defects in the research; for example, the characteristics of the input provided. The vagueness may simply reflect the formulation of the original input or the fact that the 'pure academic scope' of the study led researchers to ask questions that lacked meaning to those interviewed.

However, it is important to point out that in both the methodologies, generality as a feature is in part structural in the sense that it stems from the theoretical framework.

Consider first the case of causal maps. Whenever the collective causal map is constructed out of individual ones, using the most cryptic label nodes, priority is automatically given to the least specific, least detailed and least analytical statements. This, moreover, is implicit in the notion of 'cryptically', itself: the label notions have to be generic if they are to act as the screen on which the meanings of the organization members are projected. The more general (almost banal) the statement, the easier agreement on them becomes. This would explain Bougon's (1992) comment that industry recipes are good candidates for cryptic-node status. Industry recipes (Spender 1989) are judgements and statements valid for the entire business sector, and are therefore statements as innocuous as they are widely endorsed.

The method used to generate social representation avoids this problem by exposing itself to a potential fallacy. As many authors have noted, in almost all the empirical approaches to the study of social representations (includ-

ing ours) the consensual nature of social representation is assumed. Consensus is presupposed in analysis rather than being allowed to emerge through analysis. Distinct social groups are assumed to share specific representations while, in fact, the intra-group similarity is an artifact of the procedure used so that an element of circularity is introduced into the approach (Potter and Litton 1985; Parker 1987). In our case, for example, the 'shared' representation is constructed by the researcher with successive abstractions. However, to produce concordance the researcher has to climb the ladder of generality to a level that eliminates those variations and differences which, when surfaced in an effective social conversation, would, in fact, trigger conflict and process, as in the case discussed above. The manufacture of consensus here hardly renders a 'deep' representation and is very generic.

Our findings seem, then, to pose a dilemma between specification and generality in the construction of organizational cognitive maps, especially when constructed jointly with organizational actors:

– when they are too specific, they provoke disagreement over the meanings of the nodes. Significant in this respect is Langfield-Smith's (1992) experience, when he was forced to give up his attempt to construct an extremely detailed map by means of comparison and discussion because of his subjects' repeated failure to reach agreement;

– when they are accepted too readily by the organizational members, the maps usually comprise, as in our case, statements that are largely generic.

Finally, it is worth noticing that the generic nature of the content of the maps, as well as their fundamental adherence to the official 'vision' and jargon may well derive from problems of access, i.e. the role of the researcher as prescribed by the two methodologies. In both cases, in fact, data were collected through short interviews, no matter how non-traditional.

The attempt to uncover meaningful and relevant data on what people think may well have been hampered by the fundamental unwillingness of members to disclose sensitive opinions to researchers who were perfect strangers to them.

Some authors suggest that this issue has been systematically underestimated within the empirical study of social representation. Potter (1996) and Ibanez (1994) attribute this lack of attention to the role of discursive practices and social conditions of data gathering to contamination of the empirical study of social representations by the most positivist-oriented North American research tradition of social cognition.

At the same time, in our study, there was no evidence to bear out the hypothesis that a structured, but low-interference, methodology like the Self Q test produces results different from (and better than) those obtained from a more traditional approach, such as the one used to gather data on social representation.

Bougon declares that on account of a certain number of features (minimization of interference, high level of feedback, use of the organizational actors' own expressions and language), the 'Self Q Test' is the cognitive technique that most closely approaches sophisticated ethnographic methods

of data gathering: the creation of a self-exploratory 'setting' should help to forestall the tendency of actors to repeat, even individually and privately, the theories proclaimed at the official level of the organization.
However, in our study, participant assessments indicated that interpretation and synthesis by the researcher is as effective if not more effective in shedding light on reality beyond the level of the official accountable version of things, as the actors themselves are, if left to work on their own.
One notes, then, that even a sophisticated methodology based on ethnographic principles is unable, on its own, to take the place of personal relationship. Depth — i.e. the willingness of respondents to reveal opinions that are at odds with the official version — is tied to the researcher's ability to build trust and, therefore, gain the confidence of members of the organization. As ethnographers have frequently reported, any short-cut which seeks to replace participant observation with 'external' structured tools, however sophisticated, yields unsatisfactory results. The members of the community observed, in fact, tend to say what they believe the researcher expects from them, and provide a version in keeping with the official norms established by authority in that community.

Final Remarks

The results of our research experiment yield interesting information on the two methodologies for mapping organizational cognitive processes.
The Self Q methodology allowed us to construct a causal map which was capable of representing some of the normative principles of functioning and accountability in the group of managers under scrutiny. The 'object' produced by the methodology resembles a snapshot of a process, a partial and fragmented view of how meaning is negotiated among members of the organization, triggered by the sense-making task put forward by the researcher. As a result of its particular data-gathering approach, based on self-questioning sessions conducted individually, the method ended up emphasizing the affective dimension of social relations within the group, leaving uninvestigated other aspects of the organizational life.
The social representation, derived by applying a quantitative procedure to data abstracted and coded from semi-structured interviews, was capable of capturing a broader range of aspects of organizational thinking, including some emergent distinctions between the identity of the group as a community of practice and the corporation as a wider social and power reference system. Although in a rather static way, this approach yielded a somewhat more comprehensive representation of the categories used by the members to make sense of the organizing process and their role in it.
Although the limitations of our study caution against drawing any final conclusion, the suggestion can be put forward that it might be possible to use the two methodologies for different purposes. The methodology of cognitive maps via the Self Q Test (survey technique + representative technique) is more complex and sophisticated, but more suited to in-depth analysis of

small sectors and groups. It is extremely useful as a point of departure for group discussion, although it needs external support for interpreting the data in the map. The methodology (survey technique + representative technique) of social representations is a useful tool in that it provides a general picture of the existing situation. As such, it could have a similar and partially overlapping function with that of inquiries into the corporate climate.

At the same time, however, the portrait of organizational thinking processes yielded by both methodologies is somewhat shallow and static, and individual aspects are either explicitly present — as in the causal map, or concealed by the methodology, as in the case of the social representation. As stated above, this well may be the result of our research limitations, or a weakness of the specific methodologies selected for our 'road test' — hardly exhaustive of the list available to generate either causal maps or social representation. There is, however, the further possibility that these problems stem from more fundamental issues which affect both approaches: issues that have more to do with the underlying theory than with the methodologies used in our research experiment.

As reported above, both approaches were chosen for this study because, although stemming from different research traditions, they were supposedly attuned with the personal constructivist agenda and the researchers' bias for qualitative research. After all, Serge Moscovici and his associates have forcefully argued against critics that social representation is fundamentally a constructivist approach, although some of its empirical application may have surrendered to ways of speaking and writing influenced by more positivist approaches (Moscovici 1984; Jovchelovitch 1996: Wagner 1996). At the same time, Bougon sometimes maintains a strong, linguistic-based constructionist perspective on organizational phenomena, at least when he argues that organizing activities are not based on, and do not give rise to, shared meanings (Bougon 1992).

However, in spite of other differences (and in spite of the claims of the two authors), both approaches share at least two common features which put them both at odds with constructivist principles. They both subscribe, although inadvertently, to a representationalist approach and they both propound a model of social thinking as a fundamental ideational activity sharply separated from current practices and the material world. It is our contention that these features of the theory, behind the methods, hinder the capacity of the two methods for mapping organizational cognition to yield a rich, in-depth description of organizational cognition processes. In other words, while the approaches reveal certain aspects of the organizational cognition phenomena, at the same time, because of their basic assumptions, they screen out other, potentially more meaningful, aspects.

In the first place, both approaches subscribe to the idea that ordinary people live in a world of individual and/or social representations of things. Although the introduction of a social dimension into the collective ideational process constitutes a significant departure from the traditional rendition of the human being as an individual information processor typi-

cal of cognitivism, both theories still conform to what Steve Woolgar has called 'the ideology of representation' (Woolgar 1988). Within this traditional train of thought, which lies at the core of the rationalist and positivist Western scientific tradition, representations and reality stand in a mutually sustaining position generated within a model that depicts thought as the mirror of nature (Rorty 1980).

In other words, the very notion of representation, map, conceptual scheme or similar brings with it a number of ontological and epistemic consequences, such as a fundamental dualism between reality and thought, a mirror-like view of thinking and knowing, and the concept that mind and thought are inextricably related to human individuals and brains. Some of the problems encountered by our methodologies, including the unresolved individual level of analysis, may therefore be rooted in the incapacity of a representationalist epistemology to solve some of the dualism generated by its own principles. In a nutshell, the ideology of representation makes researchers look for the wrong 'kind of things'.

Note that the power of the ideology is such that it defies any attempt to take a more metaphorical and processual approach, such as, for example in the case of Bougon. As mentioned above, Bougon (1992) takes a sophisticated and dynamic approach, affirming that organizations and social systems *are* cognitive maps. However, as soon as he posits the very idea of cognitive maps in relation to organizing processes, he readily opens up the hunt for such maps, and it is inevitable that we end up looking for the map that members use in their minds or heads to participate in organizational processes. According to the philosopher Donald Davidson (1974), this pattern of consequences, which in fact also applies to the theory of social representations, stems from the very idea of a conceptual scheme (or cognitive map): once introduced into any theory to explain collective behaviour, the very idea of a conceptual scheme, map or representation introduces a static and individual dimension that defies any processual view and becomes itself an issue to be resolved within the theory.

As has been convincingly argued by a number of authors within many post-positivist social psychology traditions, the only way out of many of the problems generated by the ideology of representation inherited from the positivist and neo-positivist approach to knowledge and cognition is to recognize that people do not live in a world of representations, but of discursive productions and language games (Wittgenstein 1953; Gergen 1985; Potter 1996). Social representations and causal maps need to be re-conceptualized as discursive productions and linguistic repertoires within a wider general process of ordering and sense making, in which the emergence of social order and the construction of social boundaries (such as that of a 'group') become a phenomenon to be explained instead of an assumption as part of a theory.

In the second place, both theories purport cognition and representation to be pure 'thinking' processes, sharply separated from every day 'doing': representations are mental formations, incessant babbles of conversations (Moscovici 1984). Hence, maps and representations mostly operate as

collective 'mental frameworks', so that the construction of reality is, in fact, a re-presentation (Ibanez 1994) more than a practical activity. Although, in this paper, we have described in detail the painstaking practical activity necessary to construe our maps and representations of the organization (which included very practical accomplishments such as taking buses and trains, phoning, writing, using tape recorders and computers), the theory itself introduces a sharp split between thinking and doing, the mental and the practical, so that the realm of symbols becomes separated from that of praxis.

In recent years, however, authors have begun to promote research programmes which abandon the assumption that knowing and making sense of the world are mainly individual and mental processes, conceiving of them, instead, as mainly social and cultural phenomena. Through what Bruner and Haste (1987) have described as a 'quiet revolution', the dominant model which has implicitly conceptualized thinking and sense making as the effort of individual actors processing information or modifying their mental structures has been confronted with an alternative view that sees individuals as social beings who construct their understanding and learn from social interaction within specific socio-cultural settings. Authors in the field of cultural psychology, building on the works of Vygotskij (1962), Mead (1934), and Bruner (1986, 1991) have developed a perspective that conceives human cognition and learning as being closely related to the material, symbolic, and social context in which they take place.

In order to understand cognitive competencies, it is therefore necessary to explore the specific contexts of activities and the social practices in which they occur. Attention needs to shift from the sphere of the 'purely mental' to that of discourse as a set of discursive activities and materials capable of giving real form to an object or set of objects, together with the structures and practices involved in their production and circulation.

To understand organizational cognition, we need to focus on the local and global discourses, that is, on the textual and expressive aspects of large-scale patterns of ordering which reach through, and are performed in, the network of the social. The sense of shallowness of the maps produced in our research may well come from their incapacity to grasp the intentional but not-subjective modes of ordering which speak through, act, and recursively organize a full range of social materials (Law 1994: 112; see also Foucault 1979, 1981). Thinking and sense making in organizations, as elsewhere, are to be found as much as in what people say or say they think, as much as in what they do and do not do, and in the artifact they use. It is to this broader range of phenomena that we need to turn our attention in future research.

Notes

* This research was carried out jointly by the author and Fausta Fabbri. While its merits should be divided equally, responsibility for the present essay lies solely with its author. My sincere thanks go to Silvia Gherardi and Antonio Strati for their help in connection with this article. I also wish to thank Sue Whittle and the anonymous reviewers for their thoughtful comments and Moira Doherty for her editing work.

1. Bougon et al. (1977) and Weick and Bougon (1986) indicate three different kinds of supra-individual causal map: *assembled* causal maps consisting of the simple matching of the patterns of dyadic interaction which regulate the reciprocal action of organization members; *composite* causal maps constructed by an external observer (the researcher or consultant) who attempts to synthesize the common perception of the group from individual causal maps; and *average-based* causal maps derived 'artificially' by calculating the average of the ordering indices. In the latter case, it is possible to evidence both the 'average' cognitive map of the group and the standard deviation of each of its individual components (see, in particular, Ford and Hegarty 1984; Weick and Bougon 1986; Bougon 1990). Other methods for comparison and analysis among maps have recently been proposed by Laukkanen (1994,1998) and Marcóczy and Goldberg (1995).
2. Considerations about the intrinsic static nature of mappings of dynamic processes also apply to social representation. If we do not advance criticisms of incongruity between theory and findings, it is because the very notion of social representation, at least in some versions of the theory, has often been accused of purporting a static view of social life (Potter and Litton 1985; McKinlay and Potter 1987; Ibanez 1994) and because theory and methodology have been intentionally decoupled (Moscovici 1988; De Rosa 1990; Breakwell and Canter 1993).

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