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A PHENOMENOLOGICAL UNDERSTANDING OF INFORMATION SYSTEMS: FROM EPISTEMOLOGY TO CONCRETE CONNECTIONS

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Abstract

Which epistemological contribution social studies of Information Systems can give to organization studies? In particular, which contribution the actor-network perspective can give? Social studies of Information Systems (Avgerou et al. 2004) are influenced by social studies of science and technology. Social studies of information systems arguments are based on case studies. The question we would like to answer with the present contribution is: how to develop general arguments of organizational design when the evidence comes from single case studies? In what sense this procedure can be considered scientific? Our goal, in the first place, is to demonstrate how normative arguments concerning organizational design can be developed starting from local analyses on implementation, adoption and use of information systems? Furthermore, we will proceed by identifying in the concepts of bounded rationality, external environment and information some relevant directions for an actor-network contribute to organizational design.

Keywords: objectivity, representation, bounded rationality, external environment, information.

1 INTRODUCTION

Which epistemological contribution social studies of Information Systems can give to organization studies? In particular, which contribution the actor-network perspective can give?
Social studies of Information Systems (Avgerou et al. 2004) are influenced by social studies of science and technology. Social studies of information systems arguments are based on case studies. The question we would like to answer with the present contribution is: how to develop general arguments of organizational design when the evidence comes from single case studies? In what sense this procedure can be considered scientific? Our goal, in the first place, is to demonstrate how normative arguments concerning organizational design can be developed starting from local analyses on implementation, adoption and use of information systems? (section 5). Furthermore, we will proceed by identifying in the concepts of bounded rationality, external environment and information some relevant directions for an actor-network contribute to organizational design (section 6).
The first step to do is to review the debate between rational and social accounts in the Information Systems literature, by reviewing the dualism between technology production and technology usage (section 2).
The underpinning epistemological dilemma can be re-phrased by the following options: it is the structure that constrains the organization, or is it the actor to impose himself over structure or, again, it is a process of iterative evolution between the two?
It is necessary to recognize the philosophical positioning of these options, going back to its phenomenological origins (section 3).
The epistemological position we will introduce, the actor-network, distinguishes itself from the above mentioned positions by refusing the dualism subject-object, by the use of the symmetry principle between humans and non-humans and, finally, by the use of correlative concepts (section 4).
The division between rational and social accounts, according to Latour (one of the representatives of the actor-network position), takes place only after the fact. We will discuss how this position can not be ascribed to a form of a-posteriori absolute rationality.
In conclusion, starting from the elaboration of the representational paradigm by Latour, we will proceed with a review of some approaches of organizational analysis, focussing on the re-analysis of the concepts of bounded rationality, external environment and information.

2 THREE EPISTEMOLOGICAL PERSPECTIVES

There are organizational theory notions that can be drawn from social studies of information systems. In the field, a central theoretical role is assigned to technology. Technology, in social studies of information systems, does not result as a mere analytical dimension of organizational analysis. Technology is a fixing device of social relations (Latour 1994). It is a methodological standpoint to study the entire organizational action. In the social studies of information systems field there are different epistemological positions. Here we present some that represent the dominant positions concerning the debate between rational and social accounts in the information systems field. These are the ethnometodological, the phenomenological and the deconstructivist perspective.

2.1 Ethnometodology

We introduce the ethnomethodological by quoting the words of the founder of the ethnomethodological programme, Harold Garfinkel, and then describing how this perspective was adopted by Lucy Suchman in her article “Representing Practice in Cognitive Science” [1990].
The ethnomethodological perspective is concerned with the link between representations of action contained in a culture, and interpreted by traditional sociology as a guide for human action, and the methods by which members construct reality locally [Garfinkel 1967].

We then discuss an essay by Andy Crabtree, Mark Rouncefield, Peter Tolmie entitled "'There's Something Missing Here': BPR and the requirement process", which uses the ethnomethodological perspective in analysis of a corporate information system [Crabtree *et al.* 2001].
The ethnomethodological perspective derives from Garfinkel's critique of Durkheim's conception of the nature of social facts. Contrary to Durkheim's view that a fundamental principle of sociology is the objective reality of social facts, the ethnomethodological perspective assumes that the reality of social facts is a process of continuous accomplishment in the concert of daily life activities. Thus the mission of ethnomethodology is to study the artful and ordinary modes by which the process of accomplishment is learned, applied and taken for granted by members.
When applied to the study of physical and biological facts as social facts, the ethnomethodological perspective clearly distinguishes between situated practice and planning, describing representations in their use. In her study on cognitive science practices, Suchman [1990] conducts a critique on the planning model in which a representation is conceived as able to control human action. The plan, considered as a set of detailed actions, operates as a programme able to control human action. The action is viewed as derived from the plan, so that the plan becomes a substitute for action. Once this substitution has been accepted, the problem of action is taken as solved. The remaining task is to refine the model.
According to Suchman, however, the plan is a useful tool with which to discuss human action. But its relationship with action is not that of a substitute but of a resource which is part of the situated practice. The function of the plan, therefore, is not to provide a specification or a structure to control local interactions but to orient the course of action beforehand. Plans specify the extent to which the specification is useful, and they are vague on precisely how far it is meaningful to quit the specification and rely on the availability of contingent and ad hoc answers.

2.2 Phenomenology

To introduce the phenomenological perspective, we shall refer to the essay "On Multiple Realities" by Alfred Schutz [Schutz 1971] in which he discusses the nexuses among various orders of reality (the essay concentrates in particular on the nexus between the world of daily life and the world of scientific contemplation) and their specific features. In his essay "On Multiple Realities", Alfred Schutz [1971] traces some of the consequences of the analysis of our sense of reality conducted by William James in his Principles of Psychology. James states that there are different and distinct orders of reality, each of them with its own specific and distinct mode of existence. He calls them "sub-universes" and provides as an examples the world of physical things (as the reality par excellence), the world of science, the world of ideal relations, the world of tribal idols, the various supernatural worlds of mythology and religion, and others. The popular mind, he says, conceives these worlds in more or less unrelated manner, and when it considers one of them, it temporarily forgets its relationships with the rest. Every object of which we think refers to at least one of these sub-worlds. "Each world, when we participate to it, it is real in its way; but the reality disappears together with the attention"[1]. Schutz extends this approach beyond the psychological sphere to turn it into a philosophical problem. He concentrates on the relation between daily life and the world of scientific contemplation. To clarify this relation, he coins the term "finite provinces of meaning". Each province of meaning is characterized by a specific cognitive style. All experiences within a province of meaning are per se coherent with the cognitive style and compatible with each other. But what is more important, for my analysis here, is the concept of the 'finiteness' of a sub-world that clarifies its relation with the others. Each province is finite because it is not possible to refer one province to another via a transformation formula but only with a leap due to a trauma.

[1] James H., Principles of Psychology, New York: Henry Holt, 1890. vol II, cap.XXI pp.283-322.

The study that reveals the presence in the literature of a phenomenological perspective in analysis of large-scale information packages in organizations is entitled “From Control to Drift”, written by Claudio Ciborra and colleagues.

The study of the concept of strategic alignment is for Ciborra an appropriate context for questioning the status of the abstractions frequently found in the management science literature and their relationship with what happens in the field.

The question is this: what happens when the various areas of strategy, organization and technology are connected in the same geometrical representation? Do we have a new and better organizational performance? The answer is ‘no’. This geometrical representation has a limited impact on the organization’s ‘primordial soup of anonymous practices and events’ [De Certeau 1984]. This is because knowledge of, and exposure to, theories may not be enough to learn a new behaviour [Argyris and Schon 1996]. According to Ciborra, a representation that does not work, such as that of strategic alignment, causes a breakdown. Breakdowns are opportunities to adopt a different vision of the organization’s lived world, one more closely tied to evidence, intuition and empathy than to geometrical models.

2.3 Deconstructivism

By ‘deconstructivist perspective’ we mean a research approach to artefacts and representations intended to reveal the concepts, assumptions, politics and implications contained, embodied, inscribed in artefacts and in the representations by their authors, designers or engineers.

This perspective can be said to have been initiated by the philosopher Langdon Winner in his “Do Artifacts have Politics” [Winner 1980], where he stresses that technologies are not neutral but may irreversibly embody forms of oppression. Winner’s argument is that tangible artefacts (including architectural space and other material and spatial devices) embody social relations (that is, forms of power).

The example given is that of the design of New York’s parkway bridges by the urban planner Robert Moses. Winner notes that the bridges were designed at a low height by Moses in order to keep buses – and the people who at that time could not afford a car – away from the Long Island beaches. The analysis of this example ends by affirming that not only do artefacts have politics but their politics are the most perverse because they are concealed behind a facade of objectivity, efficacy and functionality. This perspective has been applied in the same way in a study on information systems in organizations [Leigh Star 1999]. In her article, “The Ethnography of Infrastructure”, Susan Leigh Star writes:

“There are million of tiny bridges built into large-scale information infrastructures, and millions of (literal and metaphoric) public buses that cannot pass through them.”[2]

2.4 applicative outcomes

The foregoing review has outlined the topics and perspectives in the literature on ERP systems. It has presented the three dominant theoretical apparatuses used to study representations in organizations. But the epistemological perspectives adopted in study of ERP systems produce bilateral narratives. The social worlds introduced by these perspectives are given a dualist structuring between on the one hand the domain of practices and, on the other, that of models, systems and plans with different degrees of relation. By emphasising the central importance of local redesign for the success of information systems, ethnomethodological, phenomenological and deconstructivist studies fail to

[2] Susan Leigh Star, “The Ethnography of Infrastructure, in *American Behavioural Scientist* 43(1999) 377-391.

recognize the role of other actors in stabilizing the system: for instance, the production chain, the developers, the physical environment, the competent authorities, legislators, interest organizations, and the scientific community.
The studies on the implementation, adoption, and use of information systems deriving from these epistemological perspectives depict a monolithic technology on the one hand, and an organization with only the binary choice of changing itself or changing the system, on the other. In some cases, they show that user organizations adapt to the system rather than the reverse. Davenport [1998] discusses how information systems typically force users to replace informal ways of working with a more formal 'business process template' incorporated in the software.
Other studies more closely based on ethnographic methods show that even the most prescriptive systems are 'localized' by consumers. Scott and Wagner [2006] describe how the standard formats of information systems are 'compromised' through user 'skirmishes' and resistances, so that a more localized system emerges.
A third position is represented by those who, in seeking to reconcile the previous two positions, emphasise that technology and organization are often aligned through a combination of complicated organizational changes, on the one hand, and reconfiguration of the software on the other. This process has been called 'mutual adaptation' [Orlikowski, 1992].
Evident in these results is the lack of a sophisticated conceptualization of the processual ordering of the numerous competing accounts of the evolution of information systems within organizations. Much of the current research on information systems is restricted by its use of only short-term results. It is based on 'snapshots' of reality which emphasise only single phases or aspects of the life-cycles of software packages (usually the implementation phase). The studies deriving from these epistemological positions do not adequately address the long-term co-evolution of artifacts, representations and their contexts of use. The objective of such studies is to show that the possibility for these systems to work is an 'accomplishment' by the users, which reconcile the mismatch between the system and work practices. According to these studies, if information systems are able to work in different contexts, this is due to a substantial local effort of re-design around the user organization's practices and culture.
Most of this literature tends to emphasise the clash between specific organizational processes and the system's generic presuppositions during the implementation of information systems. This reflects the presence of a predominant narrative: that the context is always different, unique and distinguished by idiosyncratic practices, while the technology is both 'singular' and 'monolithic' [Pollock et al. 2007, Grimm et al. 2006].
Discussing technology from the perspective of the conflict between engineering and practice-based forms of knowledge prevents conceptualization of the collective arrangements that stabilize a technology.

3 THE PHILOSOPHICAL POSITIONING OF THE DEBATE: GESTELL

It is necessary to recognize the philosophical positioning of these options, going back to the Heideggerian discussion over the essence of technology (Heidegger 1954). Considering the propositions presented in the literature review, it does not seem possible to give an univocal answer to the question if it is the structure to dominate over the evolution of the organization, or if it is the actors to impose themselves with their initiatives or again if the evolution is produced in an explorative and interactive process (De Paoli, 2007).
The heideggerian reading concerns the overcoming, in considering the world, of the Greek thought by the Latin ratio. This transformation consists in passing from the use of geometrical abstractions as useful approximations of reality to the purporting that abstraction constitute actual expressions of reality.

Heidegger comes to considering philosophy as dispersed in single fragments of science and technique, in a world dominated by calculation. The philosophy is then dissolved in the calculative thinking, in the cybernetics. The techniques manifest the end of philosophy. In the 'Question of Technology', Heidegger starts by saying that considering technology as an instrument does not allow to discover its essence. Certainly technology is a means towards a goal, but this is not enough. Heidegger starts by exploring the concept of cause from the Greeks: the cause is what is responsible for something else, what make manifest, that brings forward, that makes evident. The word 'poiesis', that means 'to do', is interpreted by Heidegger as 'to bring forward': the nature brings forward, the blossoming of a bloom in a flower. Nature does it by itself. If we take a silver glass, it is brought forward, made in existence by a craftsman that use some instruments to transform silver and to produce a container. To produce derives from the Latin 'producere', that is 'pro-' that means to bring and 'ducere' that means to conduct. When something is produced, something that was not present before is brought to presence.
Even modern technology reveals something, but in a different way: this mode can considered as a challenge, an imposition. In Heiddeger words, somewhere a piece of ground is forced to produce carbon and mineral. The ground reveal itself as a carbon district, the soil as a stock of mineral. The work of the farmer was not forcing the soil and the field he was tacking care of, whilst contemporary technology is profoundly different from that: the agriculture itself has to be considered a mechanized food industry. The act of ordering and forcing this reserve that is characteristic of modern technology has been called by Heidegger as ge-stell, that is translated as enframing. It is a general state of the world, the triumph of the Latin ratio that replaces the Greek concept of being. In this situation, according to Heidegger, there are two risks: first that the human being does not see and do anything different from what is allowed by this ordering and the second that nature presents itself only as a complex ensemble of calculative forces. In this way, only what is rational can be known. And not what is true. Starting from this position, from which all the above mentioned epistemological perspectives all derive, it does not seem possible to give an univocal answer to the question either the rational accounts or the social or a mixture of the two are to explain the structural variation in the organization.

4 THE ACTOR-NETWORK PERSPECTIVE

In order to define an univocal position concerning the dilemma over the explanations of the structural variation, we refer to the actor-network perspective. We will do that first by presenting Latour critiques to the Heideggerian position.

Heidegger position stimulated some critiques by Latour. In the treatment of the definition of technology, Latour maintains that for a symmetry principle, the action is not only a human property, but of an association of human-and-non-human 'actants'. Symmetry means, for Latour, what is conserved after a transformation. In the symmetry between humans and non-humans, the constants are the competences, the properties and the possibility to modify the actants roles. Positioning himself at a level that is prior from the moment in which properties and competences are clearly observable and interpreted with the emergence of a distinction between humans and non-humans, Latour distinguishes himself from these philosophies for which the human being is made by his tools (Marx, Bergson, Leroi-Gourhan 1993). In the same way, he takes a distance form the Heideggerian position on the essence of technology, criticizing the Heidegger relevant myth of the technology dominance over nature. Proceeding with the description of the notion of 'black-box' (Latour 1999,p.185) – where a given assemblage can be described in a reversible way, according with the crisis it is undertaking – Latour proposes a peculiar ontological status for the representation: it can not be said they do not act, they do not mediate action. This said, Latour specifies that, whilst representations are constructed, it can not be said they are our slaves or instruments or evidences of the Gestell, since one can not establish if they exist as objects, as assemblages or as sequences of actions of expert designers dispersed in space and time.

The status of objectivity must be problematized. Non-humans escape the status of objectivity two times: they are not object known by a subject; they are not objects manipulated by a master (nor they are master themselves).
Concerning the temporal perspective, the heideggerian line of destination, Latour has a specific argument: we have never been modern. There is a continuity between the technique of the ancients (poiesis) and the modern technology (large scale, domineering). Contrary to Heidegger, Latour argues that the distinction between the techniques of the ancients and the modern technology is not that while the first exhibited a mixture of technical and social elements, the second exhibits more autonomy from the social order. The difference is just that the latter translates, enrols and mobilizes much more elements, much more tightly connected than the first. The relation between the scale of the collective and the number of non-humans involved in it is crucial. In modern collectives there are longer chains of action, more non-humans connected to each other. Who tries to distinguish between ancient techniques and modern technology attributing to the latter efficiency and objectivity and to the former more humanity, is profoundly mistaken. The adjective modern does not describe a bigger distance between society and technology but more intimacy.

4.1 actor-network epistemology

Actor-network perspective represents a positive account of the epistemology of social studies of information systems. Latour (1999) describes an aspect of going beyond the determination of scientific practice as a purely social or purely technical factor that can be applied to organization theory.

> We do not have, on the one hand, a history of contingent human events and, on the other, a science of necessary laws, but a common history of societies and things. Pasteur's microbes are neither timeless entities discovered by Pasteur, nor political domination imposed onte the laboratory by the Second Empire social structure, nor are they a careful mixture of "purely" social elements and "strictly" natural forces. They are a new social link that redefines at once what nature is made of and what society is made of.

Latour replaces both the social and the natural with a single category: that of the actant (a term coming from semiotics)and, in doing this, he overcomes the active/passive dichotomy. The traditional view conceives an active human (both individual or social) that acts upon a passive nature. In this perspective, we construct through action but we discover a passive reality. The category of actants proposed by Latour includes entities that traditionally are considered agents but also entities that are considered passive objects. Latour proposal consists in a valuable advancement in overcoming the active/passive dichotomy, since the debate over realism and social construction can be thought in term of knowledge passively discovered o actively created by the scientist. The overcoming of the active/passive dichotomy brings with it also a re-thinking of the representational paradigm that is rooted in the dichotomy between rational and social accounts of the organizational structural variations.
In the representational paradigm, the knowledge is considered valid is it is founded on something that is external from the practice (something real in the world). The negation of this foundation, on the contrary, renders knowledge as a mere construction.
Latour position is that of rejecting the question on what is the determining factor in constructing a fact (sociology, technology, politics or ethics). The argument we can draw from Latour is to study organizational practice without attributing a privileged status neither to rational nor to social accounts.
Latour demonstrates that the division between social and rational is the result of a negotiation process between actants. A new scientific procedure emerges with human and non-human actors embodied in it, producing as a result the definition of social and material elements. The stabilization of facts, representations and artefacts comes first. While traditional organizational metaphysics requires classifications in a-priori static categories (natural or social, material or mental) that make genuine historical change impossible, Latour neglects that there is an a-priori, a-temporal distinction between

nature and mind/society and, in doing this, he rejects the question on what stabilizes and scientific practice the same way as, elaborating the representational paradigm, he refuses to answer the question on what makes true a proposition.
Latour position arguing that classifications come only after the fact can seem an a-posteriori rationalization: a form of idealism. But this critique must be rejected. One can simply argue if an a-priori division between social and rational can be better. The methodological lesson drawn from actor-network perspective, coming from the use of case studies to construct organizational theory, is that this distinction comes only after the fact and that it has a limited duration.
In the next session we will describe the use of case studies as a methodology for the actor-network perspective. We will argue that this procedure can produce generally valid arguments of organizational theory. Afterwards, we will exemplify these arguments on traditional concepts of organizational theory as bounded rationality, external environment and information.

5 THE SCIENTIFIC VALUE OF CASE STUDIES

There are two typical models by which the proceeding with case studies relates with general accounts of the organization. The first model is the bottom-up procedure. This procedure, typical of localization studies, does not produce general arguments. The outcomes is, at most, a negation of general organizational principles proposed in other studies. In the second model, typical of rationalism, an a-priori program is adopted and case studies are developed starting from it. The problem of this mode is that, if not from a privileged methodological intuition, there is no way to justify such a purely a-priori position.
In the present proposal we offer two different modes, related to actor-network perspective, to face the problem of the grounding of general organizational accounts.
The first is to adopt an ‘interest model’, that can be Marxism, feminism or the like. These positions are also defined ‘ethnocentric’. While the ethnocentric ‘interest model’ can be considered a top-down procedure, thus privileging the point of view of a specific community, it can be seen as non-absolutistic in its deliberate adoption of a value-laden position.
Temporary points of view, instead of absolutistic positions, can be comprehended among the methodological instruments of organizational theory from an actor-network perspective.
A second approach, related to the first, that distinguish itself from typical models, is that to use case studies as an evidence of what methodology can work best, without deliberately adopting any point of view from the beginning. According to this approach, we can learn how to learn. The evidence of a methodological choice derives, according to this approach, from the success of case studies realized and this evidence can not be established before use. The point to use a specific methodology will be pragmatic and temporary. This approach recalls the fact that the starting point for a research is the point where we are. This model can also be opportunistic, and adopt whatever methodological approach can seem adequate or relevant for the case.
There is no reason to think that the contextualization of the approach (as in the two cases presented) can be considered as a scientific de-legitimation: local practices, fallible and historical have not to be considered scientifically illegitimate.
The anti-essentialist position brought forward by an organizational theory based on case studies does not correspond to maintain that all universal arguments are false. We argue instead that there is no universal scientific method to study organizations.
The restriction of the point of view to a specific community seems to exclude the possibility of any generalization. But this is not automatically true. It can be possible to identify a consistency that does not have anything to do with the adoption of an a-priori position based on a top-down approach. And this consistency can be considered epistemically independent. In other words, it is necessary to evaluate case by case the appropriateness of presuppositions. For what concerns the normative approach to organizations the argument is the same: we are all in the same position when we have to convince someone else. Standards and local norms have always a role. It is not necessary to argue in

favour of a privileged positions as a starting point to criticize the organization. Presenting an argument as universal or transcendental can not be more convincing that presenting it without these adjectives.
It is often thought that local, non-theoretical analyses, are inadequate to support a normative position, that local knowledge can be only descriptive. These preoccupations are too abstract, and based on a foundationalist model of grounding.
Local analyses will be as large as they are made. If a way is to be found to create connections between disparate events, the result will be to have an extended analysis. As Callon and Latour emphasized (Latour and Callon 1981), the lesson to be learnt is that the connection between historical actors and ideas must be shown at the local context. There is anyway no theoretical limit to the scale of the analytical network that can be created. Extending this idea to an organizational theory based on case studies, one can affirm that there is no limit to the critical power of a local analysis. The political force of a local analysis will have its own practical and concrete questions, not abstract arguments on the mode of grounding. For a position to have any effect, it is necessary to muster allies, to be read and cited, and make a difference at a practical level. One can not say in advance which argument will work in a specific community.
After describing the elements by which an organizational theory that draws on case studies is different from the relativistic approach, we now turn to the description how it can be distinguished from the rationalistic approach of the bounded rationality.

6 ELABORATING ON THE REPRESENTATIONAL PARADIGM

The elaboration of the representational paradigm consists in conceiving that there is only one settlement, that connects ontological problems with ethical, epistemological and political problems. Questions as: “How the brain can know the external world?”, “How an organization can react to external circumstances”?”, “How decision concerning structuration can be made on the basis of available information?” become meaningless.
Very quickly, these questions reveals themselves as contradictions, because the definition of mind, society, organization and information are produced all at the same time and they imply each other. Turning the attention of organizational theory to the practice of organizing, employing case studies, it happen that questions that seemed, at a theoretical level, to be answered independently are, at a practical level, tightly intertwined. The main move that allows to comprehend this settlement derives from the rejection of the subject-object dichotomy, and consequently, from the refusal to follow up the debate that tries to overcome this dichotomy with synthetic or analytical re-compositions. Object and subject are related concepts, that imply each other, in a relation of complicity and antagonism.
This dichotomy is replaced by a chain of humans-and-non-humans in the organizational practice. This move implies a replacement of the notion of epistemology tout-court, towards a concept of ‘concrete connections’. The idea that a mind-in-the-vat, single and isolated, watching the external world, tries to extract certainty from the relation between words and things, represented and representation, has to be abandoned. There is no external world, not because it is a social construction, but because there is not an internal mind, with its language as the only resource.

6.1 A critique to the notion of bounded rationality: representation as an attribute of the process of action

In the followings we will see how some features of the representational paradigm, elaborated in the actor-network fashion, will contribute to comprehend the relationship between bounded rationality and organizations. The literature on bounded rationality gives the impression that bounded rationality is a cognitive process that takes place ‘in the brain’ and that its boundedness is a function of the boundedness of the human mind:

> The capacity of the human mind for formulating and solving complex problems is very small compared with the size fo the problems whose solution is required for objectively rational behaviour in the real world – or even for a reasonable approximation to such objective rationality (Simon, 1947).

When we see the problem of bounded rationality in terms of techniques of representation, both the concepts of rationality and boundedness acquire a different meaning. To illustrate this difference, let us present two examples of technology: the chair and the glove (Cooper 1992). The chair and the glove represent (replace, are in stead of) specific aspects of the body and of its interaction with the world. The chair represents the general shape of the human skeleton and compensates human tendency to tiredness. The same way, the glove (let us take the example of a industrial glove) represents the hand. While the natural hand is frail (it can be easily burnt), the glove is robust and refractary. While the body and its parts are limited by a natural fragility, it is precisely this limitating condition that abilities and promotes the representation process. In these examples, we will see that the human rationality it is not specifically cognitive but it is intrinsic to the general field of action of the body and its parts, and that boundedness, far from being a restriction, is a necessary stimulus to representation. As representations, techniques and artefacts are embodied processes that remedy and compensate the deficiencies of what is represented and at the same time extend, magnify its power.

6.2 Representation as a topological correlate: organization and external environment

Conventional organizational analysis typically sees its object of analysis in terms of separate categories, that are intended to occupy a singular and isolated space. The traditional division between organization and external environment is one example of this mode of analysis. The concept of bounded rationality (Simon, 1947) is a further example of singular and isolated space: rationality is contained inside the limited cognitive capacity of the individual decision-maker. Serres (1982a) calls ‘Euclidean’ this way of thinking. Setting everything inside singular spaces, motion without change of space, disconnected morphologies. When Serres proposes the notion of translation, used also by Callon (1986), he suggests that is necessary to recognize a topology of movement that recognizes that human action takes place not in space but between spaces. This is just what is offered by the notion of representation. The notion of representation in the actor-network perspective proceeds by doubles or correlates – the couple complicity/antagonism of the relation internal/external is just an example. In the topology of the correlates the inside is an interiorization of the outside, its double. Representation translates the external in the internal. On the contrary, bounded rationality, as a singularity, remains always an internal resources that acts upon an external problem. It is an alley of concepts as intentionality and objectives, that are too presupposed elements of an organizational decision-making directed from the inside of the individual. For the representation, intentionality and objectives are themselves movements of topological correlates of the organizational space that does not reflect an external regulation. They are just governed by their reciprocal correlation. Conventional organizational theory is still generated in an Euclidean space that prevents to it the comprehension of its object. The elaboration of the representational paradigm under the actor-network perspective offers a way out to this impediment.

6.3 Representation as election: information and choices concerning structuration

A last consequence of the epistemological turn offered by an actor-network perspective concerns the idea that information is the base for the coordination of the organizational structure (Maggi 1990). The use of the notion of information – coming from Simon’s critique to bounded rationality (Simon 1978), that maintain that human rationality is severely limited and the organization is an instrument to solve problems coming from this condition – underestimates a central aspect of information processing: the representation. Information theory starts from the construction of a representation (pattern, image, model) of some aspects of the world. The representation must exist before talking of information and concerned choices. Representation comes first; information is what augments or reduces the power of

the representation. In the present proposal, organizations are not just organizers of information. They are also the place where information takes form. A problematization of the concept of representation that is particularly pertinent here is considering induction and election as the same representational process (Callon 1986). When an object is represented with another object, model or diagram, epistemologists speak of induction. When a human being is represented by another human being, political scientists use the notion of spokesman. In the actor-network perspective, the two terms are interpreted as the same translation process, based on a common double movement. The first is the displacement of an entity from a place to another. The second is the selection of the intermediaries that allow to select a spokesman. The present proposal is thus that of using the notion of spokesman for all the actors involved at different levels of a representation process, independently if it involves humans or non-humans. Speaking in the name of others means in both cases silencing those in whose name one speaks. This logics, embedded in the concept of representation, is not respected if one analyses organizations as organizers of information based on an intentionality that is boundedly rational. The reason for this is that these analyses postulate the existence of a natural entity called organization that, like bounded rationality, is already there in front of us. The argument, in the actor-network perspective, is that the notion of representation does not require this a-priori postulate. And that the nature of 'shared spokesman' of the representation that is the base for information has not to be taken for granted.

7 CONCLUSION

Using the actor-network perspective we problematized the notion of objectivity and the notion of representation. This allowed us to elaborate a method of organizational research and some principles to elaborate notions of theory. The notion of objectivity has been elaborated two times: non-humans escape the status of objectivity because they are not objects known by a subject and because they are not objects manipulated by a dominator (nor they are dominators themselves or simply a mixture of the two aspects).

The notion of representation has been elaborated three times: the things represented continues to exist and co-exist together with the representation. The representation magnify some characteristics of what is represented (the example of the chair and the glove); it is with it in a topological relation of complicity/antagonism; the representation stays on the border of the represented things, it is its double; finally, in order to be as such, a representation has to have the power of silencing the represented thing and this is the product of shallow alliances.

These elaborations allowed us to comprehend that if situated knowledge, real life and procedural knowledge are phenomenological, so are also plans, geometrical representations and declarative knowledge. The two phenomena are correlative, they imply each other reciprocally and both are part of an organizational practice. It is not necessary to distinguish rational accounts from social accounts. The debate over their re-composition has to be refused from the beginning. According to the proposed scheme of analysis, it is necessary to re-thing organizational theory with the use of case studies at the centre. The results pertaining structuration phenomena in the organization are the result of a process that requires additional work of negotiation and association, that can not be explained neither through performances of bounded rationality nor through the concept of information as a grounding for decision-making. The accurate description of the additional work of association and negotiation necessary to make organization working must be integral part of the attention addressed by the designer to the issue of structural variation. According to the proposed elaboration, such attention is close to Ciborra idea of hospitality (Ciborra 2002) and that of social practice design (Jacucci et al. 2007).

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