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SOME PROPOSALS FOR EPISTEMOLOGICAL ADVANCES IN THE STUDY OF ORGANIZATIONAL LEARNING

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Abstract:

Organizational Learning (OL) is a scientific field characterized by a long history and growing interest, so to be considered a core and promising concept in theory and practice related to the management and the organization of work.

This paper addresses the two main issues that have been dominating scientific debate in the area: the terminological confusion and the paucity and limitedness of the relevant empirical studies. The perceived need for systematization is not just a call for a unified vocabulary, but mainly a call for epistemological advances on topics like knowledge, learning, organizations, and innovation.

These problems may be generalized to the claim that the social sciences are strong on theory, but relatively weak on practice, and that organizational learning appears to be no exception. The aim of this paper is to discuss some theoretical proposals on those topics, casting them within the complex systems framework, and to outline empirical research relevant to the issues discussed.

Keywords: organizational learning, knowledge, complex systems, innovation.

JEL Classification: O15

1. Introduction

There is a long history to the study of organizational learning and interest in it is still growing (Visser 2007). In recent years, however, terminological issues have been crucial to the field. While organizational learning has been widely considered as a source of strategic advantages (Maula 2006), the phrase organizational learning has been used and conceptualized in a confusing variety of interpretations (Garavan 1997, Huysman 2000) and little consensus has been achieved on its precise meaning (Thatchenkary 1996). According to Clegg, Kornberger and Rhodes (2005) this not only requires a unified vocabulary but hints above all at the need for a deeper understanding of topics like knowledge, learning, enterprises and innovation.

The current paper addresses these issues and proposes epistemological advances cast within the theoretical framework of complex systems (von Bertalanffy 1967), a framework which is consistent with what is currently known about both human biology and the structure of organizations (Magalhaes and Sanchez 2009).

Complex systems theory provides a basis to understanding the wide array and many types of macro-level phenomena that will arise when individuals are brought together and begin to act in coordinated ways (Goldspink and Kay 2004). We will outline a number of universally accepted features of complex systems that characterize the domain (Heylighen 2008) and discuss their implications for the world of organizations.

Like all complex systems, organizations will not fit into linear models and the idea of causal predictions which is embedded into them. However, there may be certain long-term patterns underlying the behaviour of complex systems, and it may still be possible to formulate some simple general rules that describe complex systems behaviour (Jackson, 2000).

2. The relations between knowledge processes and innovation

Organizational knowledge is widely recognized to play a key role in the creation of innovation (Davenport and Prusak 1998, Drucker 1999, Nonaka and Takeuchi 1995, Stata 1989), so much so that De Geus (1988) claimed that the ability to learn faster represents a company's only sustainable competitive advantage. More generally, the evidence is compelling of a connection between an organization's human resources management and its performance (see Wright, Gardner, Moynihan and Allen 2005 for a review).

However, the models that have been proposed to capture this relation often are unclear as to what exactly leads to what (Alcazar, Fernandez and Gardey 2005, Gerhart 2005).

Katou and Budhwar (2010) ascribe this limitation to the use of inappropriate statistical methods: most studies, they argue, have been based on cross-sectional data, employing either hierarchical regression models or competing regression models, without proving causality.

While the importance of methodology is undeniable, however, we believe that the problem of proving causality goes beyond it, and that a further theoretical analysis of the very nature of the relations that hold between HRM practices and firm performance is needed.

According to Baker and Sinkula (2002), differences in learning orientation may yield differences in innovation. It has also been suggested (Day 1994, Slater and Narver 1995, Dickson 1996, Han, Kim and Srivastava 1998, Baker and Sinkula 1999a, 1999b) that the ability to engage in higher-order learning, combined with a strong market orientation, makes a company more likely to achieve long-term competitive advantage in dynamic markets.

Of course, it would be factitious to look for linear causation when studying a relation which appears to be circular and complex. A virtuous circle may instead be envisaged whereby well-framed HRM practices impact positively on firm performance, making further investments in human resources themselves possible; of course, a specular vicious circle may be envisaged as well, going the other way round (Dougherty 1992). On the one hand, organizations that depend on innovation to survive need to continuously improve how they deal with and learn from any new and unfolding innovation journey (Van de Ven, Polley, Grau and Venkataraman 1999). On the other hand, highly innovative companies often find it necessary to invest in training, since the specialized skills that they need are not easily recruited (Garud *et al.* 2006). Finally, there can be little doubt that the whole picture would include internal factors that are not strictly knowledge-based, like corporate climate, as well as broader socio-economic ones (Purcell, Purcell and Tailby 2004). Therefore, time becomes the key factor to capture the actual causal dynamics; it should be taken into account with longitudinal studies (Katou and Budhwar 2010).

Given this landscape, it is unsurprising that organizational learning has become a core and promising notion in theories and practice related to the management and organization of work (Clegg, Kornberger and Rhodes 2005). However, the ways in which such phrase is used and conceptualized appear to be confusing (Garavan 1997, Huysman 2000): little consensus has been reached on its precise meaning (Thatchenkary 1996) beyond accepting that if we talk about knowledge and learning in organizations, then we are referring to organizational learning

Skerlavaj and Dimovski (2007) report as many as fourteen different definitions of organizational learning, ranging from a focus on *problem solving and recovering* (e.g. Argyris and Schön 1996: organizational learning is a process of detecting and correcting errors) to a focus on *innovation* (e.g. Stata 1989: organizational learning is the principal process by which innovation occurs), from an *information-processing view* (Huber 1991: an organization learns if through its processing of information the range of its potential behaviours is changed) to a *semiotic or phenomenological* one (Schwandt and Marquardt 2000: organizational learning represents a complex interrelationship between people, their actions, symbols, and processes within the organization), and so on.

Such proliferation of definitions can, at least to some extent, be seen as a natural side effect of the great and growing interest in a lively and important field of research and practice. As a sign of a still increasing

amount of interest, Visser (2007) lists several special journal issues devoted to the topic: one of Organization Science in 1991, one of Accounting, Management and Information Technology in 1995, one of the Journal of Organizational Change Management in 1996; and one of Organizational Studies in 1996. Argote and Miron-Spektor (2011) add that several books and handbooks have also been published. Bapuji and Crossan (2004) go even beyond in proving the 'phenomenal' growth of interest in organizational learning, providing accurate data on the papers published over the period 1990 – 2002.

Some view this sprouting of definitions as a problem in itself (e.g. Popper and Lipshitz 2000), insofar as it prevents the field from converging toward a unified framework. These scholars argue that an ultimate vocabulary is needed, one whose terms convey precise, easily comparable meanings.

Indeed, there has been such a flourishing variety of proposals for the conceptualization of organizational learning that the area has been characterized as a 'jungle' or 'volcanic activity' (Prange 1998, Huysmann 2000). The metaphor of a volcanic field nicely captures the extraordinary explosion of interest in the discipline, fostered by the compelling evidence of a relation between an organization's management of human resources and its economic performance. Such a metaphor also points to the multiplicity of foci of interest and debate about organizations and learning. While attention to some topics persists or becomes even fashionable, other streams of discussion lose their appeal; as a result, the picture we get is dynamic and continuously evolving. Any efforts to build a map can 'at best produce a transient and incomplete snapshot' (Easterby-Smith, Crossan and Nicolini 2000). These efforts usually take the form of a review, which further underlines the need for systematization. Bapuji and Crossan (2004) noticed that about 10% of the papers they selected in their overview were either review papers or papers that aimed at clarifying some issue by relying on extensive reviews of the literature.

However, Clegg, Kornberger and Rhodes (2005) argue that this generally perceived need for systematization is not just a call for a unified vocabulary, but mainly a call for epistemological advances on issues like knowledge, learning, organization and innovation. Such advances ought to be consistent with current knowledge about human biology and the structure of organizations (Magalhaes and Sanchez 2009).

3. Epistemological advances: the micro-macro divide

The first issue that a theory of organizations should explain is the relation between the constitutive elements of social systems, namely persons, and the emergent phenomena that result from their interactions. This is one of the most discussed problems not only in the organizational field, but in any approach to social phenomena.

Thus, Goldspink and Kay claim that 'without a capacity to explain this relationship there is, in effect, no substantive theory of sociality' (Goldspink and Kay 2004, 597).

In the organizational field, the difficulty to explain this relation results from a lack of integration between the individual and the social level and is often referred to as the micro-macro divide. Let us consider a paradigmatic example: strategy. Despite being widely considered the core feature of a company's success, strategy has been conceptualized in different perspectives, seemingly impossible to reconcile. Noting that it is difficult to provide a definition of this concept, Gavetti and Rivkin (2007) explicitly derive this fuzziness from its dual nature:

'First, strategy exists in the minds of managers – in their theories about the world and their company's place in it (Porac and Thomas 1989, Huff and Jenkins 2002). Second, strategy is embodied. It is reified in a firm's activities (Porter 1985), rules (March *et al.* 2000), and routines (Nelson and Winter 1982). Understanding the origins of strategy therefore requires a grasp of how both its aspects – the mental and the physical – jointly come into being. That is, it requires the characterization of a two-part search process. One part occurs in the world of cognition and comprises the mental processes that mould particular theories about the firm and its environment. The other part unfolds in the world of action and consists of mechanisms that shape what a company actually does' (Gavetti and Rivkin 2007, 420).

The resolution of the macro-micro divide would have both an ontological and an epistemological import, since it would explain:

- '1. Ontologically, what[...]the origin or nature of social phenomena [is] and how[...]they emerge from the action of individuals in particular context of action.
2. Epistemologically, how [it is] that we can come to know about social phenomena' (Goldspink and Kay 2004, 598).

Goldspink and Kay (2004, 598) further argue that 'both questions are complicated by the fact that many, if not all of the contexts of action are themselves social'.

As regards this issue, however, we share Clancey's (1997a) view that the social nature of human contexts, actions and knowledge, far from being a complication or, in his words, 'a peripheral or an implementation concern', is at the very heart of human existence. Consistently, Clancey points out that there is a terminological misinterpretation of the word social, whereby social actions are commonly seen as somehow subordinated to individual ones, and the latter appear to be synonym of acting alone. The adjective social is thus limited to actions which are carried out in interaction with other people. Instead, he argues, social is a fundamental ontological feature of human activities and their contexts. Our activity, as human beings, is always generated, shaped, constrained, and given meaning by our on-going interactions within a business, family, and community, even when we are alone.

In the field of organizational learning, the relation between individuals and organizations is framed by the very question '*who is learning?*'. Huysman (2000) reviewed the relevant literature, scouting the hidden ideas and assumptions underpinning many writings on organizational learning. Her conclusion was that most authors focus on the individual level, supporting the idea that it is the individuals who learn within the organizational framework and therefore that organizations are mainly or only considered the background site of learning.

On the other side, there is a smaller but growing area of literature which adopts a cultural perspective, where the focus is less on individual cognition or behaviours than on what is going on in the practice of groups and organizations. When organizations are defined as cultural or collective processes the focus is not on individuals as such but on the organization as a community (Cook and Yanow 1993, Henriksson 1999, Weick and Roberts 1993, Yanow 2000). The individual thus becomes a participant in the organizations and their culture (Elkjaer 2003):

'Cultures of groups and organizations like the cultures of societies, tribes and communities have a collective nature; there is no such thing as the culture of an individual' (Huysman 2000, 85).

Of course, a phrase like 'collective nature' is not spent very freely in cognitive science, if only because it opens well-known debates concerning collective intentionality, intentions and actions as contrasted with their individual counterparts, and so on. What we are interested in here is to highlight that approaching learning as culture has the advantage of focusing also on organizational, vs. merely on individual, aspects of learning.

Still another issue is that it is misleading to discuss the question of 'who is learning?' without also giving an account of what knowledge is. Let us then explore this further question.

4. What is knowledge?

What we can know about the world, how we know it, what the status and the role of experience are and, in general, what nature, origin, and status to attribute to knowledge have been among human kind's most burning questions.

Western perspectives onto these issues have traditionally taken one of two forms: rationalism and idealism (Cilliers 2000). The former – also named positivism, modernism, objectivism, rationalism, and epistemological fundamentalism – is based on the assumption that the world can be made rationally transparent so that the knowledge about the world can be made objective. The latter – also labelled relativism, idealism, postmodernism, perspectivism, and even sheer flapdoodle – is based on the assumption that knowledge is always someone's knowledge, and links the notion of knowledge to others like experience, culture, and context.

These two perspectives are imported, not always consciously, into the organizational learning field, where it is possible to retrace their alternate fortunes and misfortunes, as well as those of the various theoretical streams that embraced the one or the other.

'Theories of learning, like all scientific theories, come and go. Some innovations reach deeper than others; occasionally, theoretical changes amount to a conceptual upheaval' (Sfard 1998, 4). Sfard (1998) goes on to argue that the notion of knowledge in organizational learning has been dealt with essentially by means of two metaphors, which she respectively labels acquisition metaphor and participation metaphor. This dichotomy should not be mistaken for the well-known divide between individualist and social perspectives on organizational phenomena (Sfard 1998). Rather, it resembles other dichotomies, widely spread in the wider area of the cognitive sciences, like that of symbolic representationalism vs. constructivism and embodied cognition (Watzlawick 1981, Mate and Tirassa 2010, Tirassa and Vallana 2010). Despite having opposite underpinning ideas of knowledge, however, these two metaphors have not been conceived of as mutually exclusive and are simultaneously present in most of the works in the field (Sfard 1998).

In the acquisition metaphor the mind is conceived as a container, knowledge as a substance, and learning as the transfer and addition of substance to mind. This perspective is also intrinsic to the attempts to build formal and computational knowledge systems (see Clancey 1997b): in fact knowledge has to be objective and considered a commodity among the others if it has to be gathered, stored, and manipulated without the intervention and of a subject and independently of the subject's activity.

This perspective pervades several conceptions of organizational phenomena. For example, the enhancement of information processing and decision-making in organizations is often viewed as susceptible to being improved by the acquisition of relevant information and knowledge on the part of the individuals, whose organizational behaviour becomes modified in its turn (Elkjaer 2003). Learning here is identified with the accumulation and the acquisition of some kind of private or internal property. What remains problematic is the understanding and the explanation of how an individual learning outcome may be transferred to the organization (Elkjaer 2003).

According to Sfard (1998) the core idea of the participation metaphor is the suggestion that learning takes place as processes of participation in communities of practice (Wenger 1997, Elkjaer 2003). This idea goes under several names in the literature on learning and organizational learning, e.g. situated learning (Brown and Duguid 1991, Richter 1998), social learning (Elkjaer 1999), learning as cultural processes (Cook and Yanow 1993, Henriksson 1999, Yanow 2000), or practice-based learning (Gherardi 2000).

In this framework, to learn is to participate in organizational life and work practices. The on-going learning activities never are considered separately from the context within which they take place. The context, in its turn, is rich and multifarious, as shows through talk about situatedness, contextuality, and cultural embeddedness (Sfard 1998). The set of new key words that, along with the noun practice, prominently features terms like discourse and communication suggests that the learner should be viewed as a person interested in participation in certain kinds of activities rather than in accumulating private possessions. To put it differently, learning is conceived of as a process of becoming a member of a certain community.

In the literature about organizational learning cast within the participation metaphor, adds Elkjaer (2003), learning is regarded as a natural part of human activity – it can, in other words, not be avoided: it is just part of everyday organizational life and of the work practice into which it is integrated.

Recently, there have been attempts to find a third way beyond the fundamentalist/relativist dichotomy (Elkjaer 2003). According to Cilliers (2000), however, when they come to the technological applications of theories of knowledge, there is an implicit reversion to one of these traditional positions.

Cilliers (2000) suggests that a way out of the objectivist/subjectivist dichotomy is instead offered by the paradigm of complexity. Complex systems, indeed, as we will discuss further on, tend to exhibit emergent properties, that is, properties that are not reducible to the properties of any specific subsystem. To put it the classic way, the whole is more than the sum of its parts.

When looking at knowledge from this vantage point, the knowledge that an organization possesses and produces turns out to include both the knowledge which is possessed by the individuals and the subsystems and that which emerges from significant relations between them as well as between each of them, the organization as a whole and the external environment. Actually, the knowledge possessed by the individuals, the subsystems and the organization as a whole is only relevant to the other levels, or to the other

agents belonging to the same level, inasmuch as it becomes manifest and available to them in the unfolding of the interactions that they have with each other (Mate *et al.* 2010).

As Cilliers (2000) notes, an understanding of knowledge as constituted within a complex system of interactions has at least two important implications.

On the one hand, such view denies the very idea that meaning can be objective. Knowledge happens in a dynamic network of interactions, one that is devoid of distinctive borders: therefore, knowledge cannot be atomized and conceived of as a fact.

This becomes particularly important when the problem of assessing knowledge is taken into consideration. Hargadon and Fanelli (2002) provided an overview of different modalities of assessing knowledge in organizations:

- measuring organizational knowledge by measuring the cognition of individual members of the organization,
- focusing on knowledge embedded in practices or routines and viewing changes in them as reflective of changes in knowledge, and therefore indicative that organizational learning occurred,
- measuring changes in some characteristic of performance like its accuracy or speed, as indicative that knowledge was acquired and organizational learning occurred,
- assessing the characteristics of the organization's products or services, its patents stock, and so on.

However, Stacey (2000) is very critic of these attempts of assessing knowledge. In his opinion from the standpoint of complex systems theory, 'knowledge is continuously reproduced and potentially transformed in processes of interaction between people. It follows that people cannot 'share' knowledge because one cannot share the actions of relating to others, only perform them. It also follows that knowledge as such is not stored anywhere. All that can be stored is reifications in the form of artifacts, or tools, which can only become knowledge when used in communicative interaction between people. It becomes impossible to talk about measuring knowledge as 'intellectual capital,' because knowledge itself does not exist in measurable or any other reified form.' (Stacey 2000, 23).

On the other hand, a theory of knowledge as constituted within a complex system of interactions correspondingly denies that knowledge can be purely subjective. The subject cannot be conceived as being prior to the network of knowledge; instead, it is in itself constituted within that very network. Knowledge in interaction with other agents therefore is a matter of intersubjectivity (Tirassa and Bosco 2008).

An agent's flows of knowledge may be oriented to the self or to the environment. Self-oriented knowledge contributes to the construction of meanings and narratives that may become shared with the subsystems and the individuals that participate in the organization. It is also crucial to the formation and the maintaining of a coherent identity of the whole organization. Knowledge which is instead cantered on the environment helps the agent to keep adapted to it. Adaptedness is a dynamic property which depends on the relation between the states, the flows and the events that are internal to the agent and those that are external to it (Tirassa, Carassa and Geminiani 2000).

Cilliers's (2000) statement that the dialectical relation between knowledge and the system within which it is constituted has to be acknowledged is particularly interesting:

'The two do not exist independently, thus making it impossible to first sort out the system (or context), and then to identify the knowledge within the system. This co-determination also means that knowledge and the system within which it is constituted is in constant transformation. What appears to be uncontroversial at one point may not remain so for long. The points above are just a restatement of the claim that complex systems have a history, and that they cannot be conceived of without taking their context into account.' (Cilliers, 2000, 48).

4. Innovation

Another issue which is obviously crucial to an analysis of organizations, organizational knowledge, and organizational learning is innovation. The capability to successfully innovate is generally considered an indispensable factor of competitive advantage in companies (e.g. Bakken, Hernes and Wiik 2009).

Innovation does not consist merely in the isolated generation of novel ideas; instead, it involves proposing, adopting and sharing novel ways of looking at the organization itself, the world, and the relations existing between the former and the latter (Bartel and Garud 2009). Rather than simply being an object, a specific activity or a something, it is a process which not only does require companies to generate new knowledge and ideas, but also makes it necessary to connect such knowledge and ideas with opportunities and contingencies available inside the company itself as well as in its environment (Bartel and Garud 2009). It thus is better viewed as an emergent property of the functioning of the whole organization than as a local product of the specialized activities of one or few of its subcomponents.

Framed in this way, the concept of innovation encompasses complex activities that proceed from the conceptualization of a new idea, to a solution of the problems, to the actual utilization of economic value (Meyers and Marquis 1969).

Hellström and Hellström (2002) provided a general conceptualization of innovation that puts forward as central:

- novelty, whereby something that did not exist is brought into existence; thus innovation can be defined as the creation and exploitation of new ideas (Van de Ven 1986),
- intentionality: this particular new idea, practice or artefact is created and modified by an agent for the purpose of creating value,
- a process of change, whose starting point is the conceptualization of the idea on which the product will be based and the end point is the moment when that product reaches a unit of adoption.

This clearly requires the involvement and the participation of several actors placed at different joints in the architecture of the organization (Bartel and Garud 2009, Dougherty 1992). For these reasons we view innovation as a property which can be unevenly distributed across the organization. Its scope encompasses not only technological improvement, but also the ability to scout new markets, to implement new industrial processes, to modify the relations with the trade unions, and so on. So viewed, innovation turns out to be one of the most crucial facets of an enterprise's actual fitness and performance (Laugen and Boer 2008).

In particular, there are three aspects of innovation that have been featured prominently in prior research:

- the creation of new ideas (e.g. Usher 1954),
- the commercialization of these ideas into valuable products and services (Van de Ven *et al.* 1999),
- the sustenance of these processes over time (Tushman and O'Reilly 1996).

Coordination across each of these sub processes of innovation requires that ideas be conveyed and translated across space and time, possibly incurring in difficulties (Dougherty 1992).

5. Complex systems: an outline

In the framework of complexity theories, the knowledge that an organization possesses and produces is one of its emergent properties; it includes both the knowledge possessed by the individuals and the subsystems and the knowledge that emerges from significant relations between them, and between each of them and the whole organization and the external environment.

Classical science tends to be reductionist, based on the assumption that all phenomena, events, and processes can and should be completely understood in terms of the simpler or simplest behaviours of their components, each of which can be described completely, objectively and deterministically in its turn. However, when complex, real-world problems are faced, problems with reductionism and the classical

epistemologies and methodologies may arise (Checkland 1981), and this is particularly true of issues pertaining to ecological, social and psychological systems and issues.

According to part of the literature complexity theory is the best candidate for a contemporary general systems theory (e.g., Jackson 2000). Other candidates, which we will not discuss here, include more classical versions of general systems theory itself, theories of autopoiesis, and cybernetics.

At present, however, what is called science of complexity, taken as a whole, still seems to be little more than a collection of exemplars, methods and metaphors for modelling complex, self-organizing systems (Heylighen 2008). Mittleton-Kelly (2003) suggests that, rather than a single, unified theory of complexity, theories of complexity are a conceptual framework, a way of thinking, and a way of seeing the world.

There are, indeed, several versions of complexity theories, arising from various natural sciences such as biology, chemistry, and physics. As a result, different authors have proposed dozens of conceptions, none of which appears to capture all the intuitive aspects of the concept (Maula 2006). Most of them appear to be only relevant to the study of limited types of phenomena, such as binary strings or genetics (Heylighen 2008).

Notwithstanding these fundamental problems, the notion of complexity is a promising framework to provide a basis for understanding the wide range and the many types of macro-level phenomena that will arise when individuals are brought together and begin to act in coordinated ways (Goldspink and Kay 2004).

In the next paragraphs, we will discuss a few universally accepted features of complex systems that characterize the domain (Heylighen 2008) and their implications to organizational world.

6. Universally accepted features of complex systems

By definition a complex system consists of many or at least several parts that are connected via their interactions. Their components are both distinct and connected, both autonomous and, to certain degrees, mutually dependent:

‘[...] complete dependence would imply order, like in a crystal where the state of one molecule determines the state of all the others. Complete independence would imply disorder, like in a gas where the state of one molecule gives you no information whatsoever about the state of the other molecules’ (Heylighen 2008, 4).

Like all complex agencies, a company is composed of different organizational subsystems, each with its own identity, dynamics and interactions with the other subsystems and possibly with the external environment, and partial autonomy (Tirassa 2009). Each subsystem in its turn is composed by persons, who turn out to be the most important asset in the organization (Sierhuis and Clancey 1997) and are complex systems themselves.

As regards the relations between organizations and people, Coleman (1982) remarks that organizations have the power to impose limitations on the personal autonomy of their members during working hours, bureaucratic constraints, formal and informal rules and eventually sanctions and rewards.

Most importantly, organizations have the power to determine membership. Not only can organizations choose who comes and who goes (Olson 1965, Hirschman 1970, Schneider 1987), but they also determine and shape the roles of the members and therefore the behaviours that are derived from them. Individuals belonging to an organization accept a joint commitment to uphold certain principles even when their personal preference would suggest an alternative course of action (King, Felin and Whetten 2010) and thus they give up a smaller or larger part of their autonomy (Heylighen 2008).

Individuals are then subject to physical, biological, normative and social constraints that govern what it is possible to achieve, perform and do (Jackson 2000). They have to obey explicit and implicit rules that determine which actions are allowed and which are not.

At the same time, though, complex social systems such as companies will be more likely to persist as long as they are effective and efficient (Jackson 2000) for the people who belong to and constitute them.

‘Efficiency relates to the need to provide, to individuals who co-operate, a surplus of satisfactions over dissatisfactions. Unless these individuals receive such a surfeit, they will not continue to remain as members of the organization (in the case of employees), or to have dealings with it (in the case of other stakeholders). Effectiveness and efficiency are achieved through the interactions among people as managed by both the formal (studied by traditional theory) and informal (studied by human relations theory) structures of the

enterprise. The formal structures are the consciously coordinated activities that define a common purpose, reward organizational members, and put individuals in communication with one another. The informal structures are those that arise without a common or consciously coordinated joint purpose.' (Jackson 2000, 108 – 109).

Furthermore, all complex systems, such as organisms, societies or the Internet, tend to exhibit emergent properties, that is, as discussed above, properties that are not reducible to the mere properties of any specific subsystem. To put it the classic way, the whole is more than the sum of its parts.

'For example, a cell has the property of being alive, while the molecules that constitute it lack that property; gold has the properties of being shiny, malleable and yellow, but these properties do not exist for individual gold atoms. Rather than the parts individually, emergent properties characterize the pattern of interactions or relations between them. They typically include global or 'holistic' aspects, such as robustness, synergy, coherence, symmetry and function.' (Heylighen 2008, 9).

Jackson (2000) argues that complex systems live – whether literally or metaphorically – in a zone between stability and instability, situated in between order and disorder. Their nature is neither regular and predictable nor random and chaotic: they exhibit a mixture of both dimensions being roughly predictable in some respects while surprising and unpredictable in others (Heylighen 2008). This results in an intrinsic unpredictability and uncontrollability of the behaviour of these systems, which therefore cannot be described in any complete manner. What can be found, at best, are certain statistical regularities in their quantitative features, or certain metaphors, models, and computer simulations with which to make sense of their qualitative behaviour (Heylighen 2008). Complex systems, however, can be observed to demonstrate certain general patterns of behaviour even though their specific behaviours are generally unpredictable (Jackson, 2000).

'The new name, complexity theory, reflects a recognition that complex social systems are able to change and evolve over time. They are not bound, therefore, by fixed rules of interaction and do not develop on the basis of the repetition of a mathematical algorithm. [...] Complexity theory does not deal in repetitive and predictable behaviour but embraces change and evolution in dynamic systems. It assumes that the systems it studies do not fit linear models. Despite this aversion to prediction and forecasting, it suggests that there may be some long-term patterns that underlie the behaviour of complex systems. Also it may be possible to discover some simple rules that govern complex systems behaviour.' (Jackson 2000, 82 and 88).

7. From theory to organizational practices

In order to understand (some of) the rules that govern complex systems, and thus make theories amenable to real-life situations, whether in terms of empirical research or of specific applications to the real world of organizations, the number of factors that are considered typically has to be reduced.

While this exposes the researcher to the risk of falling into reductionism, the amount of information in complex systems like organizations makes the explicit adoption of certain viewpoints necessary. The difficulty in doing so is the need to deal with a defined number of variables as elements belonging to a complex system which is characterized by dynamic feedback, circularity and autopoiesis. Being aware that the scope of the research is limited and that a set of interpretive lenses is unavoidably adopted prevents the absolutization of the results and makes interdisciplinarity possible (Morval, 1993).

In the field of organizational learning, different points of view may be adopted which emphasize the variables and the relations between them that make the analysis suitable to each social, economic, psychological, etc. domain. The choice of what to focus the analysis upon is the starting point that guides the analysis of the systems involved.

8. Identity

Systems characterized by significant non linearity can carry out a wide array of behaviours to keep their fitness (Bak 1996, Cohen and Stewart 1994, Lorenz 2001, Prigogine and Stengers 1985). Kauffman (1993) showed that two main parameters influence the dynamics of complex non-linear system: the number of agents and the density of their connectivity.

According to Schoderbek, Schiderbek, C.G. and Kefalas (1985) the complexity of a system is the combined outcome of the interaction of four main determinants:

- the number of elements that comprise the system,
- their interactions,
- their characteristics,
- the degree of organization in the system, i.e., the extent to which the characteristics and the interactions of the components are predetermined or free to evolve.

Jackson (2000) specifically emphasizes the two latter factors:

‘On the face of it, a car engine can look complex in terms of the number of elements and interactions, but in fact is relatively simple because of the limited attributes of the specified elements and the high degree of organization in the system. A two-person interaction may appear simple, but in fact can be very complex once we add in the diverse attributes of humans and the lack of specified organization in many such systems’ (Jackson 2000, 69).

And Cilliers (2005a, 2005b) argued that:

‘The system is constituted by rich interaction, but since there are an abundance of direct and indirect feedback paths, the interactions are constantly changing. Any activity in the system reverberates throughout the system, and can have effects that are very difficult to predict — once again as a result of the large amount of non-linear interactions. I do not claim that these dynamics cannot be modeled. It could be possible that richly connected network models can be constructed. However, as soon as these networks become sizeable, they become extremely difficult to train. It also becomes rather hard to figure out what is actually happening in them. This is no surprise if one grants the argument that a model of a complex system will have to be as complex as the system itself. Reduction of complexity always leads to distortion’ (Cilliers 2005, 608 – 609).

The nonlinear nature of the interactions in a complex system is the reason why complex systems have a history and cannot be conceived without taking their context into account (Cillier 1998, 2000).

When human beings and their minds are involved, identity is the long-term and more stable pattern underlying the behaviour of complex systems – specifically, of companies and other organizations.

Identity is what defines an organization (Espejo, Schumann, Schwaninger and Bilello 1996). It shapes and influences the organization's structure, its specific spatio-temporal manifestations, and the processes, routines and procedures through which identity itself is embedded in specific contexts and situations (Zeleny 2005).

The notion of identity can be understood in terms of subjective positions like ‘who I am’, ‘what my situation is’, ‘what I want to achieve’, ‘what I am going to do’ and so on. This is the foundation on which an agent – whether ‘economic’ or otherwise – frames its environment and situation, its actual and potential actions in that situation, and its interpretation of feedback received.

An organization's (or an individual's) identity is not a static image, like a still life, but a complex process in which drives toward differentiation and integration are dynamically balanced. In the case of companies, and generally of organizations, several layers of identity need be identified: the organization itself, its subsystems, and the individuals. It is the relations between the participants on and across these various levels that creates the network's, the group's or the organization's distinct identities.

The relation between the three layers mentioned is neither hierarchical nor one of reduction; the overall identity and strategy result instead from the complex interplay of semiautonomous systems (the term here is meant to include individuals) that affect each other while following each its own trajectory. Such trajectories include centrifugal and centripetal processes: a dynamic balance between the various types of trajectory is needed to maintain the fitness of the organization as a whole

9. Organizations as actors: more than a metaphor

By means of constant and distinctive patterns of choices that are relatively time – and situation – Independent, identity drives attention to certain issues and provides the language with which decision makers frame an issue (Dutton and Dukerich 1991).

This paves the way to the possibility of considering organizations as particular kinds of social actors. This means that they can and should be considered capable of behaving in a purposeful and intentional manner, influencing individuals, shaping communities and their practices and transforming their environments (King and Whetten 2010).

Therefore, organizations – and specifically companies –, like individuals, actually make choices, using their available degrees of freedom to enact strategies and complex actions that depend in turn on a somewhat idiosyncratic interpretation of the context and of the viable spaces it affords for interaction (Mate *et al.* 2010).

King, Felin and Whetten (2010) claimed that organization theories are theories without a protagonist:

'We rarely take the time to reflect on what makes an organization unique from other social entities. We in effect talk 'around' the organization rather than about it. We examine, make predictions about, assess the consequences of, and theorize the internal operations of and external influences on organizations; but our theories do not lend themselves to disciplinary introspection on the subject of the organization itself, specifically with regard to the subject of the organization as an actor.' [...] 'Describing a human as an actor involves (1) an attribution of the ability to take action and (2) an attribution of intentionality based in a motivating self-view that guides or justifies action. In contemporary society, organizational action and human action are similar in this respect (Czarniawska 1997). Although organizations do not share the same structural attributes as human actors (e.g., nervous systems), they have similar functionality' (King, Felin and Whetten 2010, 290 and 292).

Indeed it is common to consider organizations as actors and to ascribe them intentional states as a mere metaphor.

To study individuals and organizations as well as the interactions that they enact, it is necessary to adopt a subjective perspective (e.g., Merleau-Ponty 1945, Nagel 1986, Varela 1996): interpretations and actions can only be understood from the viewpoint of the individual or assembly of individuals who entertains or carries out them.

Subjective does not mean arbitrary, since feedback from the external world, albeit interpreted (vs. merely observed) by the agent, provides a counterpoint to its interpretations and actions and invites it to operate relevant changes whenever deemed appropriate.

Identity thus is both an important source both of heterogeneity (e.g. King and Whetten 2010, Espejo, Schumann, Schwaninger and Bilello 1996, Zeleny 2005) and coherence (e.g. Baumeister 1998, Mischel and Morf 2003). The notion of identity is broadly used to describe organizations' self-definitions (Albert and Whetten 1985) as well as their peculiar categories, reference groups, and taken-for-granted labels (e.g., Zuckerman 1999, Rao, Monin and Durand 2003, Whetten 2006, Hannan *et al.* 2007). Identitarian issues are involved in institutional change (e.g., Washington and Ventresca 2004) and strategic group formation (Peteraf and Shanley, 1997) and as a reference for the formation of organizational culture (e.g., Barney and Stewart 2000).

Identity is also one of the key tenets of autopoiesis theory applied to the study of organizations (Magalhães and Sanchez 2009).

10. An empirical test. Knowledge management and innovation in a sample of Italian companies

The paucity of empirical researches has characterized, historically, the study of organizational learning (Bapuiji and Crossan 2004) and has deeply contributed to its lack of clarity. Jackson (2000) generalizes this issue, arguing that the social sciences are strong on theory, but relatively weak on practice; organizational learning appears to be no exception. In Jackson's view, social sciences seldom develop methodologies which

are oriented to giving specific guidance to policy makers and problem solvers facing real-world difficulties. Furthermore, most of the empirical studies use archival data.

This results in serious limitations to their theoretical and practical impact.

In a preliminary study conducted by our research group (Mate *et al.* 2010), which we will only outline here, we explored the interplay that appears to exist in companies between Human Resource Management and innovation. This complex, multicomponent, non-linear and dynamic interplay is often viewed as a 'black box'.

Organizations that survive and grow on the market are those that are able to express innovativeness. Innovation is an organization-level property, favoured by the organization's self-perception as a knowledge engine. We consider innovation an emergent property of the entire company, rather than its specific subsystem; this property is closely linked to the ability to construct knowledge and manage the dynamics of learning and change.

If the organization is viewed as a generator and organizer of knowledge, human resources management (HRM) plays a central role in regulating, promoting and directing the learning process. Currently, however, the literature is not clear about what relations hold between HRM and the company's performance in the marketplace or its innovation profile (Wright *et al.* 2005). Even more obscure is the direction of this relation, the 'what leads to what' (Alcazar *et al.* 2005, Gerhart 2005).

We devised a protocol to study the companies' strategies for training and development and their innovation profile. The protocol consisted in a questionnaire, suitable for companies which rely mostly on an inner training and development service. The questionnaire was administered to a sample of Italian firms from the food and beverages and the fashion markets.

The questionnaire (about 100 closed questions) consisted of two sections: the first was aimed at evaluating the training system of the company, the second at assessing its level of innovation. The training system was decomposed into its Processes (setting up, designing, delivering and monitoring training interventions), Relations (the articulated network of actors involved in each phase) and Identity (the sense which is made of training and of the system who runs it within the company). Innovation was evaluated in its components of Product Innovation, Process, Organizational and Market. The two sub questionnaires were presented separately to the head of the HR or training function and, respectively, to the head of the production line.

The questionnaire was submitted to a sample of 50 major Italian companies (over 150 employees) in the fashion and food and beverage (universe: 300 companies), in reference to the years 2006 – 2008.

Some interesting correlations emerged between the processes and characteristics of internal training activities and of the subsystem that deals with them, and some facets of the company's innovation profile. Taken as a whole, innovation correlated significantly with (a) training planning and monitoring, (b) the capacity of the training function to build and maintain fruitful relations with the other actors within the company, and (c) the ability to make sense of training and to negotiate such sense with the other actors within the company. The latter point in particular points to the crucial role that HRM's attempt to pursue goals aimed at company development, in interaction with the knowledge it entertains about the company's history, identity, and activities, and so forth, plays in the internal generation of innovative processes.

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