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Micro-foundations for management research: What, why, and whither? *

Micro-Fundamentos para la investigación en Dirección de Empresas: ¿Qué, por qué, y adonde?

Nicolai J. Foss **

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ABSTRACT: Micro-foundations have emerged as an important foundational theme in recent management research. I offer an interpretation of what micro-foundations may mean in the context of management research; argue that the interest in micro-foundations have arisen as a consequence of the shortcomings of extant, dominant macro perspectives with respect to coming to grips with key management and organizational challenges related to knowledge-based production; and offer some alternative foundations, based on goal-framing theory, that are better capable of handling these challenges.

Keywords: Micro-foundations, capabilities, research heuristics, managing knowledge-based production.

JEL classification: M21

* This paper originated as a keynote speech to the ACEDE Congress, Toledo, September 9, 2009. It builds on and partly summarizes my previous work with Peter Abell, Teppo Felin and Siegwart Lindenberg.

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RESUMEN: Los micro-fundamentos han emergido de forma reciente como un tema de interés para la investigación en Dirección de Empresas. En este trabajo se ofrece una interpretación de su significado e interés para la investigación. Se argumenta que su interés surge como consecuencia de las limitaciones de las perspectivas macro, dominantes, con respecto a los desafíos organizativos y de dirección derivados de la producción basada en el conocimiento. En el trabajo se presentan también otros fundamentos alternativos más adecuados para tratar estos problemas basados en la teoría goal-framing.

Palabras clave: Microfundamentos, capacidades, producción basada en el conocimiento.

Clasificación JEL: M21

1. Introduction

«Micro-foundations» has emerged as an important theme in management research over the last five years or so. Thus, special issues have been explicitly¹ or more implicitly² devoted to the micro-foundations theme, it has figured prominently at the major management conferences, and an increasing number of papers grapple with micro-foundational issues. For example, in the strategic management field, scholars increasingly realize that understanding such issues as value appropriation (Coff, 1999; Lippman and Rumelt, 2003a; Barney, 2001), resource value (Lippman and Rumelt, 2003b; Foss and Foss, 2005), strategy implementation (Barney, 2001), factor market dynamics (Makadok and Barney, 2001), firm-level heterogeneity (Felin and Hesterly, 2006; Gavetti, 2005), and competitive dynamics (Teece, 2007) requires that substantial attention be paid to explanatory mechanisms that are located at the «micro-level» (Felin and Foss, 2005; Abell, Felin and Foss, 2007). This suggests that the pursuit of micro-foundations is not just about satisfying some formal, methodological requirement, but is undertaken to further the progress of a field.

The purpose of this article is to provide an informal introduction to some of the key micro-foundations themes. «Micro-foundations» are foundations of *something*, namely aggregate concepts and/or relations between aggregate variables. The very concept of micro-foundations arose in economics, where it was adopted as a label for self-conscious to merge micro and macro economics (Jaanssen, 2006), but is related to considerably older currents stressing «methodological individualism», particularly Austrian economics thinking on methodological issues (Menger, 1883). Austrians and other methodological individualists (nowadays: virtually all economists and a few sociologists) insisted that aggregate concepts be reduced to their constituent components (i.e., individuals and their interaction) and were generally distrustful of aggregate theorizing, that

¹ Cf. the recent *Journal of Management Studies* Call for Papers for a special issue on «Micro-foundations of Organizational Routines and Capabilities», http://www.bus.qut.edu.au/research/acbr/eirp/documents/SI_JMS_Microfoundations.pdf

² Cf. the recent *Strategic Management Journal* Call for Papers for a special issue on «Psychological Foundations of Strategic Management», http://strategicmanagement.net/pdfs/SMJ_Special_Issues_Call_for_Papers.pdf

is, theorizing involving functional, and even worse, causal, relations between macro variables (Mises, 1949).

In order to make all this more concrete, I discuss micro-foundations in a specific context, namely that of the «knowledge and organizations» literature (Grandori and Kogut, 2002) *aka* the «knowledge movement» (Eisenhart and Santos, 2002). The choice is by no means arbitrary. The knowledge movement is a dominant analytical lens in contemporary management research. It is characterized by macro-level explanation. And, yet it is one of the areas in management research where the need for a micro approach is most pressing: Organization and management for sustained value creation in knowledge-based production raises distinct challenges related to the provision of motivation and we are still rather in the dark concerning how to address those challenges, both theoretically and practically. I therefore end discussing some new micro-foundations that may be better capable of handling these challenges.

2. Micro-foundations: What are They? And Why do Need Them?

2.1. MICRO-FOUNDATIONS, REDUCTION, AND METHODOLOGICAL INDIVIDUALISM

The micro-foundations project can be seen as an instance of «reductionism.» By «reduction» is here understood the process of explaining a particular phenomenon in terms of more fundamental phenomena. By «reductionism» is understood the explanatory position that the best understanding of a complex, and in social science: collective-level, phenomenon «... should be sought at the level of structure, behaviour and laws of its component parts plus their relations» (Silberstein, 2002: 81). It entails a search for the «deep structure» underneath aggregate phenomena.

A fundamental question is *where* this deep structure is located, as there may be several analytical levels below a given aggregate phenomenon. Consider the phenomenon of competitive interaction. This can be seen as constituted by the actions of firms. In turn, those actions may be explainable in terms of the actions of individuals in firms. Often pragmatic considerations suggest that the relevant level to which we should reduce competitive interaction is the level of firms, while explanation directly in terms of individual decision-making is to be eschewed because it is too time-consuming— or otherwise resource-consuming. This may be a defensible procedure as long as we have good theories of how individual decision-making influence firm behaviour.

Whatever that exactly is, the example suggests that any theoretical (and consequently empirical) effort to explain organizational and managerial phenomena (the *explananda*) has to make a choice (though the choice is often made only implicitly) that concerns the level at which explanation takes place, that is, the analytical level at which the important components of the *explanans* are located. Notably, for more than a hundred years, economics (e.g., Menger, 1883; Hayek 1952; Arrow 1951; Dosi 1995), sociology (e.g., Lazarsfeld and Menzel, 1970; Coleman 1990) and the philosophy of science (Popper, 1957) have witnessed a

debate as to whether individuals («micro») or social collectives («macro») have explanatory primacy. This debate has raged under the label of «methodological individualism» versus «methodological collectivism.» The issue and debate carry very substantial theoretical and explanatory implications; for example, what are the relations between micro and macro levels? Do we always need to invoke micro-level explanatory mechanisms when trying to explain some macro-level phenomenon? Is it legitimate to rely on aggregate constructs as part of the *explanans*—or, are these only present in the *explanandum* of an explanatory structure? Although it is surely possible to conceptually separate the methodological domain («How should theories be constructed and evaluated?») from the ontological («What exists in the world?»), the issue and the debate also carries substantial philosophical implications, and furthermore, very different philosophical positions may be, and have been, invoked to defend the respective positions

Methodological individualism has been defended in numerous ways. For example, it is sometimes defended by invoking a deeper argument of ontological individualism, according to which only individuals, and not collectives, are acting entities. However, the argument here is rather epistemological. In line with reductionism, I take it to be the ultimate aim of scientific endeavours in the social science domain to identify and theorize the causal social mechanisms—the «cogs and wheels» (Elster 1989: 3)—that generate and explain observed associations between events. This view may also be associated with scientific and methodological realism (Psillos, 1999). It differs from the traditional covering-law model of explanation of Carl Hempel and others, because the covering-law model does not imply an insistence on identifying genuine causality. In contrast, causality is central in a mechanisms approach. Thus, to the mechanism-oriented social scientist, the discovery of how human action and interaction causally produce collective level phenomena is what science is all about (e.g., Cowan and Rizzo, 1996). Micro-foundations as they relate to methodological individualism thus mean theorizing such micro-level causality.

2.2. WHY MICRO-FOUNDATIONS?

As argued there are compelling philosophical reasons why micro-foundations need to be provided for our theories. Further reasons why micro-foundations are critical for management may be called «alternative explanations», «managerial intervention, and «fundamental causes and predictability» (cf. Coleman, 1990: 3-4).

Alternative explanations. A problem with macro-level explanation is that there are likely to be many alternative lower-level explanations of macro-level behaviour which cannot be rejected with macro-analysis alone. Even if a large sample can be constructed on the basis of macro units of analysis, a problem of alternative explanations may persist. As indicated above, alternative explanations at lower levels are readily apparent in, notably, the capabilities view, which seeks the explanation of differential firm performance in firm-level heterogeneity, that is, heterogeneous routines and capabilities. However, heterogeneity may be lo-

cated at the individual level, notably when individuals self-select into particular firms (Felin & Hesterly, 2007).

Managerial intervention. An argument for the importance of understanding micro-foundations lies in the fundamental mandate of strategic management: to enable managers to gain and sustain competitive advantage. To achieve this, managerial intervention is required, which inevitably has to take place with an eye to the micro-level. For example, a correlation between collective culture and collective outcomes inherently tells the manager very little of what should be done to change culture. Similarly, it makes little sense to argue that managers can directly intervene on the level of, for example, capabilities. Perhaps, however, managers can *influence* capabilities, for example, by hiring key employees (in which case the micro-level is directly involved) or by changing overall recruitment policies, reward systems, etc., all of which involves the micro-level.

Fundamental causes and prescription. We cannot, we contend, conceive of «capabilities» absent an understanding of the individual actions and interactions that produce a capability. We may, again, in a shorthand manner think of capabilities at t resulting from capabilities at $t-1$, but the above arguments indicate that such a macro-level explanation is rarely sufficiently fundamental. Coleman (1990: 3) convincingly argues that explanations that involve the micro level have the properties of being more stable, fundamental, and general than macro level explanations:

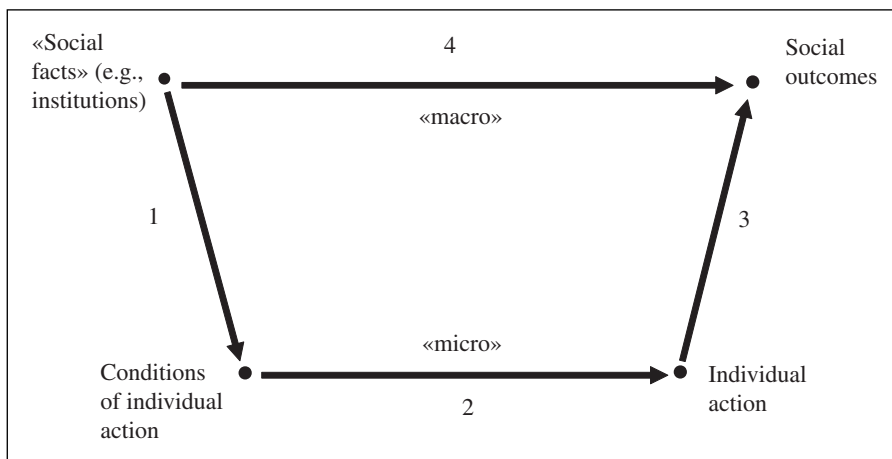
An explanation based on *internal analysis* [i.e., micro-foundations] of system [organization] behaviour in terms of action and orientations of lower-level units is likely to be more stable and general than explanation which remains at the system level. Since the system's behaviour is in fact *resultant* of the actions of its component parts, knowledge of how the actions of these parts combine to produce systematic behaviour can be expected to give greater predictability than will statistical relations of surface characteristics of the system.

To the extent that management is concerned not just with explaining past performance but also with being prescriptive, Coleman's point raises an important concern: The ability to predict is a condition for putting forward prescriptions. Micro-foundations are therefore an important part of strategic management as a prescriptive enterprise.

2.3. A GENERAL MODEL OF SOCIAL SCIENCE EXPLANATION

In order to clarify notions of «micro»/«individual level», and «macro»/«collective level», as well as examine the relations between these notions and levels, consider Figure 1 which builds on the framework popularized by James Coleman (1990).

FIGURE 1.—A General Model of Social Science Explanation



The figure makes a distinction between the macro-level and the micro-level. For example, it may be that the macro-level is organizational whilst the micro-level is that of individuals. As shown, there are links between macro-macro (arrow 4) and macro-micro (arrow 1), micro-micro (arrow 2), and micro-macro (arrow 3).³ The figure also makes a distinction, perhaps more implicit, between what is to be explained (i.e., the *explanandum*) and its explanation (i.e., the *explanans*). In social science, the aim usually is to explain either a macro-level phenomenon (located in the upper right hand corner of figure 1), such as a firm-level outcome, or a link between macro-phenomena, as indicated by arrow 4. An example of the latter may be an observed correlation between the routines and the performance of firms in a population.

To explain and understand a particular phenomenon (such as overall firm performance) the analyst makes use of theoretical mechanisms that are consistent with the arrows. Note that the arrows in Figure 1 are, from a theoretical perspective, empty boxes. They may be filled with different theoretical mechanisms, entirely dependent on theory development on the part of the analyst. For example, consider using the Coleman framework to analyze the effects of corporate culture on firm performance (e.g., Schein, 1982; Barney, 1986), whilst providing micro-foundations for this link. Corporate culture is then the macro phenomenon placed in the upper left hand corner of figure 1, while firm performance is the macro outcome placed at the upper right hand corner. An attempt to explain, say, an observed close correlation between certain characteristics of corporate culture and firm performance should, from a micro-foundations perspective, involve arrows 1, 2 and 3. However, many different explanatory accounts can be constructed. For example, in one such account, corporate culture can have the

³ Hedström and Swedberg (1996: 296-8) refer to arrow 1, 2 and 3 as «situational», «individual action», and «transformational» mechanisms, respectively.

function of credibly signalling to employees that if they invest in firm-specific human capital, they will be not be held up by management (cf. Kreps, 1990). This signal influences the incentives of employees to actually accumulate firm-specific human capital (arrow 1). The result is that individual employees will actually undertake more such investments (arrow 2). The combined effect of each individual's investment in human capital is that firm-level performance increases (arrow 3). In an alternative account, corporate culture functions, not as an incentive device, but as a purely informational device that may improve the coordination of the actions of employees, leading to high firm-level productivity and possibly high financial performance. And in a third kind of account, corporate culture imparts meaning to a firm's labour-management institutions which may also impact employee productivity and firm-specific investments, again leading to high firm-level productivity and performance (Rowlinson, 1993).

At first inspection, the framework depicted in Figure 1 would seem to formally allow for explanation that takes place solely in terms of arrow 4, that is, explanatory accounts that are wholly located on the macro level. However, whether arrow 4 explanation is deemed legitimate depends on (ontological) criteria related to an understanding of how the social world works (Mäki, 2001). Specifically, there are no conceivable causal mechanisms in the social world that operate *solely* on the macro level. There are no macro-level entities on the social domain that somehow possess capacities or dispositions to act (Cartwright, 1989) that make them capable of directly producing macro-level outcomes and there are no processes of interaction between macro-entities that take place on this level. In short, there is no macro level causal mechanism that can be theoretically represented in terms of arrow 4.⁴ However, as we shall see, substantial parts of modern management research essentially reasons as if «arrow 4 explanation» was possible.

3. Micro-Foundations and the «Knowledge Movement»

3.1. THE KNOWLEDGE MOVEMENT

The advent of «knowledge» as a central analytical lens in management research over the last two decades is comparable in scope and impact to the behavioral approach in the 1950s and 1960s. The knowledge movement has swept across many of the major management fields, such as organization and strategic management, as well as international business research, strategic human resource management, and, of course, innovation studies and technology management. It has introduced new fundamental conceptualizations and analytical lenses (e.g., the «knowledge-based view of the firm», Kogut & Zander, 1992; Nonaka, 1994; Spender, 1996; Grant, 1996; Nickerson & Zenger, 2004); new constructs («ca-

⁴ Note that this point does not concern whether the *explanandum* can be placed on the macro level. Many (most) *explananda* in social science are placed at this level (Coleman, 1990: 2).

pabilities», whether «dynamic» or not, «competencies», «routines», «knowledge sharing», «knowledge integration», «absorptive capacity» etc.); new dimensionizations (e.g., Winter's [1987] dimensions of knowledge assets); new measures (e.g., Heimeriks & Duysters, 2007); and, of course, new arguments relating to how knowledge-related constructs relate to firm-level outcomes (e.g., sustained competitive advantage, innovation, economic organization) (e.g., Cohen & Levinthal, 1990; Teece, Pisano & Shuen, 1997).

3.2. KNOWLEDGE AS *EXPLANANS* AND *EXPLANANDUM*

The knowledge movement is united in an overall conceptualization of (primarily) the firm as the main locus of the development, application, and storage of productive knowledge, and this overall notion is arguably the coordinating insight in the knowledge movement. It is important to note that this function of the firm means more than simply the firm supplying an administrative framework for the sourcing, organization and deployment of human capital inputs. It is central to many, perhaps most, contributions to the knowledge movement that knowledge can be distinctly organizational, that is, residing on supra-individual levels (Tsoukas & Vladimirou, 2001). Indeed, quite a lot of effort has been devoted to developing and defending the ontological status of such organizational knowledge (e.g., Nelson & Winter, 1982; Kogut & Zander, 1992; Spender, 1996; and for the contrary view, Simon, 1991; Felin & Hesterly, 2007).

In turn, this conceptualization has helped to organize a sustained attempt to introduce in management research various knowledge-related constructs as determinants of mainly firm-level outcomes, and to introduce final and intermediate knowledge-related outcome variables. In other words, the knowledge movement in management has expanded the set of *explananda* and *explanantia* in management. In terms of *explanandum* variables, researchers now routinely address organization-level knowledge sharing, integration, and creation as intermediate and sometimes final outcome variables. For example, Tsai (2001) investigates how intra-organizational knowledge networks impact organization level knowledge sharing which in turn impact the combination and recombination of leading, leading to innovation (cf. also Hansen, 1999, 2002). In terms of knowledge being part of the theoretical *explanans* in management research, scholars in management fields such as strategic management (Teece, Pisano & Shuen, 1997; Makadok, 2001; Winter, 2001, 2003), strategic HRM (Wright, Dunford & Snell, 2001), and international business (Tallman, 2003) have been busy over the last one and a half decade building theory in which firm-level outcomes, such as competitive advantage and its possible sustainability and the boundaries of the firm, are explained in terms of capabilities. The notion of (firm-level) «absorptive capacity», that is, the «ability to identify, assimilate, and exploit knowledge from the environment» (Cohen & Levinthal, 1990) has given rise to an extremely influential line of research in which scholars have explained knowledge transfers, alliance performance, and, of course, innovation performance in terms of such absorptive capacity. In turn, absorptive capacity itself is sometimes addressed as an outcome variable and is then usually explained in terms of prior related

knowledge (Volberda, Foss & Lyles, 2010). Scholars also address *explananda* beyond the firm level in terms of capabilities (and similar constructs). For example, Heimeriks and Duysters (2007) conceptualize «alliance capabilities» and theorize their impact on alliance performance. Foss and Eriksen (1995) conceptualized capabilities at the industry level.

The dominant thrust of all this is to reduce virtually all knowledge-related antecedents to firm-level experience (that has somehow emerged from local search processes). The notion of firm-level experience (and hence capability) unites a number of the central sources of the knowledge movement, notably behavioralism and the emphasis on locally held experiential knowledge. As such it may well be the central analytical notion of the knowledge movement.

3.3. TOOLS, TASKS AND MEMBERS

One take on all this is to recognize with McGrath and Argote (2001) that knowledge in organizations reside in multiple reservoirs.⁵ Specifically, McGrath and Argote distinguish between «tools», «tasks» and «members.» Tools may be exemplified by ITC (but more generally by all sorts of «embodied capital»), while tasks relate to discrete activities, and members are of course individuals in organizations. The authors further note that the three knowledge reservoirs may be combined or crossed to form sub-networks, so that, for example, the members-tasks mapping represents the organization's division of labor, while the members-members mapping represents its network structure and the tasks-tasks mapping leads to routines (and per implication the various constructs that are derived from the routine construct), while the member-task-tool mapping links specific individuals to specific tasks working with specific tools.

In terms of the relevance of the McGrath and Argote classification for understanding research strategies in the knowledge movement, much effort—often very managerially oriented—has been spent on examining the role of ITC in knowledge management. This effort is, however, limited to the fields of informatics and knowledge management. Much effort has also been spent on conceptualizing the task-task network as a reservoir of knowledge—namely in the enormous modern literature on capabilities, routines, etc.—, and this effort has had a broad impact on a large set of fields in management research. The exploration of the members-members mapping has recently become a growth industry in management research, partly driven by fundamental advances in the sociology of networks. However, as I shall argue, surprisingly little effort has been devoted to a research strategy that begins from members (i.e., individuals). Thus, in the following I elaborate on extant research heuristics within the knowledge movement.

⁵ Not all agree with this reservoir metaphor. In particular, Nonaka has been critical of it (e.g., Nonaka, Toyama & Hirata, 2008).

3.4. HEURISTIC I: «CAPABILITIES FIRST»

Based on behavioral organization theory and evolutionary economics, the «capabilities first» approach to theory building in the knowledge movement clearly works off of strong ideas, and there are no doubt good reasons for its strong influence, even dominance, in a number of fields in management research. Contributors to the «capabilities first» stream of research argue that productive knowledge uniquely resides in routines and capabilities, perhaps supported by «higher-order organizing principles» and «identity» (Kogut & Zander, 1992, 1996). This places the locus of knowledge unambiguously at the collective (firm) level, in effect sidestepping the level of individuals and their interaction (Felin & Hesterly, 2007). This approach has become extremely influential, particularly in strategic management and organization theory, and has given rise to an accumulating body of empirical research (Hoopes & Madsen, 2008). It represents a strong tendency to take macro variables or constructs, such as capabilities, routines, absorptive capacity, etc., as explanatory *primitives*.

From the perspective of micro-foundations, this is unsatisfactory: One does not need to subscribe to hardcore methodological individualism to grant that collective notions in social science should have micro-foundations, that there simply aren't any mechanisms that directly link macro variables, and that links between such variables should therefore be modeled as being mediated by micro variables, notably variables that capture individual actions and interactions (Felin & Foss, 2005). The absence of such foundations in the knowledge movement has more pragmatic implications. It means that the notion of capabilities (as well as related notions) is highly fuzzy: Capabilities are probably best understood as latent variables, but what exactly are the indicator variables that we might want to include when thinking about and trying to measure capabilities? Moreover, capabilities are clearly outcomes of micro-level knowledge-related behaviors, such as knowledge sharing and integration behaviors, but these are usually black-boxed in the capabilities first approach. As a result, it is not clear which managerial interventions may serve to create or change capabilities.

The bottomline is that while capabilities may be useful shorthand for complicated patterns of individual action and coordinated interaction, the capabilities first approach is badly in need of a micro-foundation. That it does not have one may have to do with its history of emergence in evolutionary economics and primarily serving as a sort of underpinning of the firm-level heterogeneity. If that is the primary purpose, one can —perhaps— treat micro-foundations in a more cavalier manner. However, for management purposes dispensing with individuals is hardly satisfactory; after all, as Barnard (1938) insisted management begins always and everywhere with the individual.

3.5. HEURISTIC II: «NETWORKS FIRST»

Over the last decade, arguments derived from sociological network theory have become prominent in management research, perhaps partly stimulated by

their affinity with social capital arguments which had become influential slightly earlier (Ghoshal & Tsai, 1998; Ghoshal and Nahapiet, 1998). As defined by Tsai and Ghoshal (1998: 464), «Social capital encompasses many aspects of a social context, such as social ties, trusting relations, and value systems that facilitate actions of individuals located within that context.» In a highly influential paper Nahapiet and Ghoshal (1998) discuss the structural (ties), the relational (trust), and the cognitive (values) dimensions of social capital. It is implied in this that social capital serves as a resource to individuals and firms because of its beneficial effects on the motivation, ability, and opportunity of individuals. Obviously, this is a large number of functions to burden a single construct with, and it raises suspicions that perhaps «social capital» suffers from the same basic problem that beset the notion of capabilities: A too heavy explanatory burden is arguably placed upon it!

Characteristically, significant analytical progress has been made by considering only one of the possible dimensions of social capital, typically the «structural» dimension. Much of this work has taken place in the context of knowledge sharing and creation. Attention has centered on explaining how intra-organizational channels of communication positively mediate the relation between knowledge and outcomes such as product innovation (Tsai & Ghoshal, 1998; Hansen 1999; Ahuja, 2000; Tsai 2001; Reagans & McEvily, 2003; Hansen, Løvas & Mors, 2005).

This literature begins from the central knowledge management tenet that by sharing knowledge, units in a network (e.g., employees in an intra-organizational network) can obtain advantages in the form of knowledge that can be used to enhance work performance (increased productivity and/or innovations). This idea is then placed in the context of sociological network approaches, whether in the tradition from Granovetter (1973) or Burt (1992), which makes it possible to build hypotheses regarding how knowledge sharing and the advantages it may cause are related to various structural properties of individuals' positions in knowledge networks.

Following Burt (1992: 80) who proposed «... to leap over the motivation issue by taking [...] a player's network as simultaneously an indicator of entrepreneurial opportunity and motivation», the literature in general takes motivation to be wholly endogenous to position.⁶ While the networks first approach, in contrast to the capabilities first approach, explicitly takes individuals into account, these individuals are often treated as mere temporary occupants of the positions that are of real interest in this approach. In other words, the networks first approach offers an impoverished account of individuals in which, for example, little attention is paid to heterogeneity across individuals. Such «thin» microfoundations may, however, fail to capture vital explanatory mechanisms on the micro level. Thus, Reinholt, Petersen and Foss (2010) argue that insights in motivation need to be integrated with network measures to better understand knowledge sharing

⁶ This also implies that position itself is seldom examined as endogenous to the choices of individuals.

in organizations. In a nutshell, we forward that while network position may determine an individual's opportunities to access new knowledge, it is only when she is adequately motivated to act on such opportunities that knowledge acquisition in fact occurs. If in fact motivation was wholly endogenous to position, this reasoning would obviously be redundant. However, there is strong evidence that employees differ in their motivation to engage in knowledge sharing (Cabrera & Cabrera, 2005), and that such motivation can be influenced by, for example, organizational design variables (Osterloh & Frey, 2000) and HRM policies (Cabrera, Collins & Salgado, 2006). This evidence suggests that motivation is *not* fully endogenous to network position.

3.6. HEURISTIC III: «INDIVIDUALS FIRST»

Whereas the capabilities first strategy suppresses individuals and the networks first strategy works with a very thin notion of individuals, the «individuals first» strategy to be discussed here begins from explicit assumptions about individuals, and tries to build to organizational level knowledge-related outcomes from such a starting point. Though dominant in economics and rational choice sociology, and of course related to the psychologist's starting point in the individual, the individuals first approach is decidedly a minority position in those parts of management that have been particularly influenced by the knowledge movement, such as strategic management and international business. An important early statement of the individuals first approach is Grant (1996) (drawing on Simon, 1991), who is explicitly critical of the notion of «organizational knowledge», points out that this construct suppresses the «mechanisms through which this 'organizational knowledge' is created through the interactions of individuals» (p.113), and endorses an approach that emphasizes the «role of the individual in storing and creating knowledge» (p.112). Other examples are Zenger's (1994) agency theoretic exploration of the incentives confronted by knowledge workers; Argote's (1999) individual-based exploration of organizational learning; Osterloh and Frey's (2000) motivational psychology-based exploration of the capacity of alternative organizational set-ups to foster knowledge sharing; Gottschalg and Zollo's (2007) linking of motivational assumptions about individuals, organizational incentives, and competitive advantage; and Rothaermel and Hess' (2007) sophisticated multi-level exploration of innovation capabilities.

3.7. WHY THE MACRO BIAS IN THE KNOWLEDGE MOVEMENT IS PROBLEMATIC

Hitherto, research in the knowledge movement has been at least strongly influenced, and more likely dominated, by approaches that while not entirely neglecting individuals and their interaction, typically focus the main attention on supra-individual antecedents when seeking to account for firm-level firm-related outcomes (i.e., innovation, firm-level knowledge sharing, integration, and creation). In different ways and to different degrees, this is exemplified by both

the capabilities first and the networks first research strategies. The existence of a macro bias is increasingly documented by bibliometric findings. Heimeriks, Felin, Foss and Zollo (2010) analyze a very significant part of the knowledge movement, that is, 4,766 papers published in 29 top journals from 1980-2009. Based on a keyword analysis, they conclude that a macro bias indeed exists. Volberda, Foss and Lyles, (2010) examine the entire absorptive capacity literature (or, at least, all those papers that reference the founding Cohen & Levinthal [1990] paper), and conclude that individuals are very seldom part of the explanatory structure of this literature. Finally, based on a study of 100 key contributions to the knowledge management literature, Foss, Husted and Michailova (2010) show that even this literature suffers from a macro bias.

This bias is unfortunate because knowledge work and knowledge-based production in general raise particular organizational and management challenges: Processes like knowledge sharing, creating, and integrating involve behaviors that are particularly difficult to measure and reward (Holmström, 1989), as both input and output measures may be very noisy. Moreover, an increasingly robust finding in empirical research is that explicit performance pay may crowd out the intrinsic motivation that is arguably critical to much knowledge work (Osterloh & Frey, 2000; Cabrea & Cabrera, 2005; Reinholt, Petersen & Foss, 2010).

Conventional wisdom in strategic management holds that the dominant sources of competitive advantage are knowledge assets that are built over time through processes of creating, integrating and sharing knowledge (Cohen & Levinthal, 1990; Kogut & Zander, 1992; Teece, Pisano & Shuen, 1997). However, these processes are critically dependent on the exercise of intelligent efforts by knowledge specialists, often in response to rapidly changing contingencies. Because they are fundamentally dependent on individual behaviors, discretion, and judgment, and an interaction, they are, however, suppressed by the extant macro bias. Theories that highlight routines, capabilities, etc. as the fundamental analytical unit are virtually silent about the exercise of intelligent effort and about the motivational requirements of knowledge-based production.

Ultimately, what is required to understand the emergence, change, maintenance, etc. of knowledge-based value creation and appropriation is an «individuals first» heuristic that can handle the specific organizational and management challenges introduced by knowledge-based production (Felin & Foss, 2005). However, the existing repertoire of cognitive and motivational assumptions in management research is inadequate for dealing with these challenges.

This repertoire has been borrowed from very different sources, notably the economics model of man and behavioralism in its various forms. Theories based on the economics model of man, notably principal-agent theory and other theories of economic organization, may represent excellent conceptualizations of many of the basic management and organizational problems connected to knowledge-based production. However, they typically offer very little concrete guidance with respect to handling these problems. Moreover, to the extent that the understanding of intelligent, adaptive behaviors is a necessary part of micro-foundations for the knowledge movement, research may not be best served by behavioralism and its various offshoots. In behavioral models, agents are hard-wired to choose certain courses of actions, and it is therefore difficult to handle

judgment, discretion, etc.⁷ Moreover, behavioralism in management has had difficulties coming to grips with motivation which is often black-boxed (as in Nelson & Winter, 1982).

In the following I sketch one recent approach that do not suffer from these problems, namely goal-framing theory as it applies to knowledge-based production. This approach is explicitly evolutionary, but builds off from «real» evolutionary theory (e.g., evolutionary anthropology, Dunbar, 2003) rather than from analogies to evolution; is fundamentally based on bounded rationality, but makes much more of it than economics and management theory in general do; and treats cognition and motivation in a unified manner, namely by means of the notion of a goal-frame.

4. Organizing and Managing Knowledge-Based Production

4.1. JOINT PRODUCTION

Foss and Lindenberg (2010) argue, based on Lindenberg (2003) that the key problem in any organization is how intelligent, adaptive effort can be mobilized by motivational and cognitive means to contribute to joint production and therefore high levels of sustained value creation. We draw on converging research in different fields (i.e., social psychology, evolutionary anthropology, cognitive science, and cognitive sociology) to build a «goal-framing theory of the firm» that identifies the motivational and cognitive mechanisms that underlie sustainable value creation. The key insight in this theory is that the management of motivation is largely the management of cognitions.

The key construct in the theory is «joint production.» By joint production we mean any productive activity that involves heterogeneous but complementary resources, task and outcome interdependences, and, importantly, where the participants recognize a joint value creating endeavor, and see themselves as part of this endeavor. Human beings have been especially equipped by evolution for participating in joint production with intelligent effort. The ability for joint production is what created the adaptive advantage of human beings living in larger groups, and it seems that the human brains has evolved as a «social brain», basically to allow us to realize these adaptive advantages (Dunbar, 2003). Apparently, the brain contains a hardwired ability to perceive a situation as one of joint production and to trigger the special motivation to participate in joint production (cf. Sebanz et al., 2006). People then see themselves and others as contributors to joint production, with each its own role (tasks and responsibilities). However, the motivation for contributing to joint production cannot be generated by appeals to self-interest with interest alignment (principal-agent theory) or appeals to do-

⁷ It is perhaps not surprising that a leading scholar who is strongly influenced by behavioralism, namely Winter (2003), relegates decision making that is not based on routines, etc. to the category of «*ad hoc* problem-solving» —which seems to place it outside the orbit of systematic inquiry. However, for the purposes of building an understanding of intelligent, adaptive behavior this is hardly a viable approach.

cility («fiat», transaction cost economics), but requires its own distinct levers. These are of a cognitive nature.

4.2. GOAL FRAMES

A key feature of cognitive processes is that they are selective (Posner & Peterson 1990). Specifically, cognitive processes take place in functionally specialized modules, some of which are hardwired (e.g., face recognition) and some of which are learned (e.g., word recognition). Social life requires flexible and inclusive modules. Such modules are activated by overarching (or «high-level») *goals*. When goals are activated and therefore focal they «frame» a situation in the sense that they inhibit other goals (see Shah et al., 2002) and govern what we attend to—that is, what concepts and chunks of knowledge are being activated; what alternatives are being considered; what information one is most sensitive about; and how the information is being processed (Kruglanski & Köpetz, 2009). For example, persons whose major focal goal is to improve their status position in an organization will be highly sensitive to information about opportunities and difficulties to do so; of their store of causal knowledge they will have only activated what pertains to reaching this goal; they will be also oriented towards the longer term, and are likely to focus on behavioral alternatives that advance their status position to various degrees. Opportunities pertaining to other high-level goals (such as «behaving appropriately» in the service of joint production) are likely to be more or less ignored unless they overlap with opportunities for the status goal. A *goal-frame* denotes a high-level goal together with the cognitive processes that are framed by this goal.⁸ Consider the three overarching goals in more detail.

The normative goal frame. This goal-frame is the heart of the motivation for joint production: In the normative goal-frame the goal is to improve what is good for the collective, by focusing on what behavior would be appropriate, whether in terms of contributing to a joint project or of what is expected or exemplary. Thus, the important aspects of a situation are normative in the sense that one is sensitive to «oughts» according to self or others, sensitive to what one observes other people do, and sensitive to what might be needed to be done, such as sharing knowledge with other employees. Intelligent effort is put into furthering collective goals. Goals having to do with the way one feels or with personal resources are pushed into the cognitive background, suspending opportunism to various degrees. Thus, if one can make people see a situation as a joint project, they will

⁸ Overarching goals can be activated in a number of ways but often they are triggered by cues in the environment. For example, Liberman, Samuels and Ross (2004) found that labeling a social dilemma game as the «Community Game» (suggesting a context with group-related decisions and an emphasis on appropriateness) versus labeling it as the «Wall Street Game» (suggesting a context with gain-related competitive decisions) made a huge difference in the relative frequency of cooperative responses (66% vs. 31%). Presumably, the label acted as a cue that triggered normative or a gain goal together with the linked chunks of knowledge, criteria, etc.

contribute considerably more to a collective good than people for whom the situation is mainly about how they feel («hedonic») or for whom it is mainly about gaining something.

The gain goal frame. Economics takes this the gain goal-frame to be the only relevant goal-frame for human beings; in goal-framing theory, it is one of the three over-arching goal frames. When people are mindful of improving (or preventing deterioration of) their resources (e.g., status and money), they are oriented towards the middle or long-term, and the criteria for goal realization are improvements in these personal resources. Such a goal-frame will make people highly sensitive to opportunities for and threats to the improvement of their resources, and thus particularly sensitive to incentive instruments. For example, in such a goal-frame individuals will react strongly to advancement schemes, are willing to invest in education if returns are reasonably certain, will be competitive with regard to advancement, etc.⁹

The hedonic goal frame. Enjoyment has long been considered a powerful source of motivation, including work motivation (Deci & Ryan, 1985). When people are oriented in a hedonic manner, their major goal is to improve how they feel in a particular situation, such as seeking direct improvement in self-esteem, seeking excitement, and avoiding unpleasant effort, avoiding negative thoughts and events, avoiding direct uncertainty. The time horizon of this hedonic goal-frame is very short and the criteria for having realized the goal are related to improvements in the way one feels. The great power of this goal-frame *vis-à-vis* rival goal-frames derives from its direct link to emotions (Ryan, Huta & Deci, 2008). If a person is put into a hedonic goal-frame by a cue that triggers it, the modularity of the frame will also make that person hedonic with respect to many other things; there is a cross-domain effect.

4.3. MOTIVATION MANAGEMENT FOR JOINT PRODUCTION

What do these goal-frames mean for the governance for the establishment and maintenance of knowledge-based joint production in firms? The obvious answer might be that firms need to sustain a normative goal-frame. However, the normative goal frame is inherently precarious. Apparently, human evolution has created an unequal strength between the normative and the other two goal-frames. From an evolutionary point of view, the ultimate success is reproduction of the individual, and therefore it is likely that individual concerns have had an adaptive advantage over concerns of the collective. Without supports, the normative goal-frame is the weakest of the three goal-frames.

⁹ An important contribution of organizational economics is to show that 1) agents in a gain goal-frame may be tempted to behave opportunistically (Williamson, 1985: 47), 2) opportunism is not compatible with joint production, and 3) opportunism can only be ameliorated, and not entirely checked, by schemes of interest alignment, allocations of property rights, and adoption of certain contract law regimes (Holmström, 1979; Williamson, 1985).

The relevant supports are structural design, reward management and relational signaling. Here is a brief list of some of these supports (more detail in Lindenberg & Foss, 2010):

Authority. While authority is an unavoidable aspect of firms, it may have negative motivational consequences. One way to mitigate the negative aspects of fiat is to have flat organizations. However, in larger and more complex organizations, this cannot be done. The solution is to find a way to legitimize hierarchy so that it is compatible with joint production. This can be done in terms of the various functions that have to be fulfilled and in terms of the necessary information, knowledge, and responsibilities that cumulate in certain functions (Adler & Borys, 1996; Lindenberg, 1993). A directive is then not the order of a superior, but the knowledge-based wish of somebody higher up in the hierarchy. It is functional to follow the directive of somebody who is better able to judge what best serves joint production in this particular case.

Rewards. While employees need to be rewarded individually in order to maintain the motivation to engage in certain activities, it is not obvious how they should be rewarded, as status advancement and money may foster a gain goal-frame and conditions that increase enjoyment of work may foster a hedonic goal-frame. Both effects can work against a sustainable normative goal-frame. However, a normative goal-frame can be supported by gain (e.g., promotion chances) and hedonic rewards (e.g., social approval) for behavior that contributes to joint production. Negative sanctions (financial or symbolic) for not contributing are likely to be legitimate in a context of joint production and will also strengthen the normative goal frame, if the behavior can be monitored correctly (Fehr & Rockenbach, 2003). In sum, hedonic, financial, career, personal development, symbolic, or task rewards can strengthen the normative goal frame from the background *if* they clearly signal recognition for contributions to joint production.

Relational signaling. Managers can signal their commitment to joint production in various ways. Rewards in a firm committed to joint production will be couched in terms of recognition. But since recognition is at the same time a signal that one cares for the relationship, the functioning of the reward system is closely tied to the workings of relational signalling. People are generally aware that these commitments must be generated by goal-frames that may or may not be stable. The «right» orientation in this sense signifies relative lack of strategic behavior. For this reason, employees will interpret the organization's actions towards employees *as relational signals*, as signs of the «true» orientation (a normative goal-frame).

Strategic «as if» relational campaigns that actually only try to create the appearance of relational concern and concern for individual improvement, will not be effective for long and will ultimately cost the organization dearly in terms of lost reciprocal commitment of employees. One can say that the commitments to individual improvement and relational quality must be continuously signaled by the organization, including in those cases where there is bad news. If reorganization is necessary, then it is even more necessary to communicate openly, show commitment to fairness, etc. Relational commitment of the central organization also shows up in how management goes about repairing relationships when something did go wrong (see Dirks, Lewicki & Zaheer, 2009). In turn,

employees signal their relational commitment to the organization by how they exert intelligent effort for the realization of the firm's goals. In sum, much of the governance in the daily interactions in an organization is equal to the exchange of relational signals.

5. Conclusions

Micro-foundations have emerged as an important foundational theme in recent management research. The interest in micro-foundations have arisen perhaps mainly as a consequence of perceived shortcomings of extant, dominant macro perspectives with respect to coming to grips with key management and organizational challenges related to knowledge-based production. Moreover, micro-foundations link to the currently fashionable emphasis on multi-level theory (Dansereau & Yammarino, 2005), because micro-foundations inherently involve considering at least two levels of analysis. As Gupta, Tesluk and Taylor (2007: 889) point out a purpose of micro-foundations (although they do not use this terminology) is to «... clearly articulate *how* concepts at higher levels of analysis emerge from lower level entities and interaction.»

Although numerous arguments can be amassed in favor of the micro-foundations project, there is also an issue about walking the talk: Calling for micro-foundations is the easy part; building those foundations is much harder. There are several reasons for this.

First, if the aim is to build micro-foundations for aggregate construct, the task is complicated by there often being many different dimensions and aspects to such constructs. For example, consider the notion of routines. Routines is a label for a number of different phenomena that only seem to share the property that they refer to some repetitiveness of sequentially taken actions among a group of people (there does not seem to be any definitional requirement that these must be employees). Other than that, routines may vary in numerous dimensions. Routines may be codified or tacit. They can be characterized in the performative or the ostensive dimension. They may be flexible or highly inflexible. Etc. (see Becker, 2004). It is quite likely that micro-foundations for routines differ as a function of such dimensions. For example, in one characterization routines are like standard operating procedures, that is, explicit and rigid (Cyert & March, 1963). They are likely to require monitoring to make sure that behaviors are in conformity with the routine. In another characterization (e.g., Feldman & Pentland, 2005), routines are flexible, adaptive, and even seems to involve a certain amount of playfulness. Routine behavior may here be more self-sustaining as intrinsic motivation is involved. In other words, motivational micro-foundations differ between the two characterizations. Moreover, there are different explanatory aspects of routines, such as their emergence, maintenance and change. Again, it is likely that what are appropriate micro-foundations for routines differ as a function of such different aspects; for example, the micro-foundations of the emergence of routines likely differ from the micro-foundations of the maintenance of routines.

Second, multi-level theory is quite simply more complex to build than mono-level theory. Links between levels are many and complicated. For example, ag-

gregating from individuals to organization in the context of networks is complex as it must inherently involve how individuals are structured in terms of density and centrality. However, examples of very successful multi-level theories, founded on clear micro-foundations, certainly exist. Transaction cost economics (Williamson, 1985, 1996) comes to mind as a prominent example.

Third, because management research draws from so many sources and addresses so many different problems, there are no clear, unambiguous behavioral models that command universal assent. There is, therefore, many degrees of freedom with respect to the choice of behavioral (micro-)foundations. However, as I have argued, this does not mean that anything goes. A key problem that cuts across a number of management fields is that of one understanding the management and organization of knowledge-based (joint) production. I have argued that our existing theories are inadequate for coming to grips with this because they only consider parts of the problem. The goal-framing theory of the firm has the potential to consider the problem in its entirety.

Finally, while ultimately there are strong philosophical reasons for beginning analysis at the micro-level (Felin & Foss, 2005; Felin & Hesterly, 2007), a micro-foundations project increases its chances of general acceptance and diffusion in the relevant research communities if novel consequences for aggregate phenomena can be predicted and demonstrated (Stinchcombe, 1991). For example, strategic management scholars should not pursue more micro-oriented research for the sake of satisfying abstract calls for methodological individualism *per se*, but because insight in, for example, endogenous preferences, biases in bargaining situations, solidarity norms, etc. impact value appropriation and value creation, and because how successfully firms deal with these micro-level issues may underlie competitive advantages (Argote, 1999). Indeed, an increasing number of studies now exist that demonstrate novel aggregate consequences of explicitly micro-foundational assumptions, and do so in the context of knowledge-based production (e.g. Gottschalg & Zollo, 2007; Abell, Felin & Foss, 2008; Lindenberg & Foss, 2010). There is therefore ground for optimism on behalf of the micro-foundations project.

References

- ABELL, P., T. FELIN and N. J. FOSS (2008). «Building Micro-Foundations for the Routines, Capabilities, and Performance Links», *Managerial and Decision Economics*.
- ADLER, P. S. and BORYS, B. (1996). «Two types of bureaucracy: Enabling and coercive», *Administrative Science Quarterly*, 41: 61-89.
- AHUJA, G. (2000). «Collaboration Networks, Structural Holes, and Innovation: A Longitudinal Study», *Administrative Science Quarterly* 45: 425-457.
- ARGOTE, L. (1999). *Organizational Learning: Creating, Retaining, and Transferring Knowledge*. North-Holland: Kluwer.
- ARROW, KENNETH J. (1951). *Social choice and individual values*. New York: Wiley and Sons.
- BARNARD, C. (1938). *The Functions of the Executive*. Cambridge: Harvard University Press.

- BARNEY, J. B. (1986). «Corporate Culture: Can It be a Source of Competitive Advantage?» *Academy of Management Review*, 11: 656-665.
- (2001). «Is the Resource-based View a Useful Perspective for Strategic Management Research? Yes», *Academy of Management Review*, 26: 41-54.
- BECKER, M. (2004). «Organizational Routines: A Review of the Literature», *Industrial and Corporate Change*, 13: 643-678.
- BURT, R. S. (1992). *Structural Holes: The Social Structure of Competition*. Cambridge: Harvard University Press.
- CABRERA, A.; COLLINS, W. C. and SALGADO, J. F. (2006). «Determinants of Individual Engagement in Knowledge Sharing». *International Journal of Human Resource Management* 17: 245-264.
- CABRERA, E. F. and CABRERA, A. (2005). «Fostering Knowledge Sharing Through People Management Practices», *International Journal of Human Resource Management*, 2005, 16(5): 270-735.
- CARTWRIGHT, N. 1989. *Nature's Capacities and Their Measurement*. Oxford: Oxford University Press.
- COFF, R. (1999). «When Competitive Advantage Doesn't Lead to Performance: Resource-based Theory and Stakeholder Bargaining Power», *Organization Science* 10: 119-133.
- COHEN, W. M. and LEVINTHAL, D. A. (1990). «Absorptive Capacity: A New Perspective on Learning and Innovation», *Administrative Science Quarterly* 35: 128-152.
- COLEMAN, J. S. (1990). *Foundations of Social Theory*. Cambridge (Mass.)/London: The Belknap Press of Harvard University Press.
- COWAN, R. and RIZZO, M. (1996). «The Genetic-Causal Tradition and Economic Theory», *Kyklos*, 49: 273-317.
- CYERT, R. M. and MARCH, J. G. (1963). *A Behavioral Theory of the Firm*. Oxford: Oxford University Press.
- DANSEREAU, F. and YAMMARINO, F. J. (2005). *Multi-level Issues in Strategy and Methods*. Amsterdam: Elsevier.
- DECI, E. and RYAN, R. M. (1985). *Intrinsic Motivation and Self-determination in Human Behavior*. Berlin: Springer.
- DIRKS, K. T.; LEWICKI, R. J. and ZAHEER, A. (2009). «Repairing relationships within and between organizations: Building a conceptual foundation», *Academy of Management Review*, 34: 68-84.
- DOSI, G. (1995). «Hierarchies, Markets and Power: Some Foundational Issues on the Nature of Contemporary Economic Organizations», *Industrial and Corporate Change* 4: 1-19.
- DUNBAR, R. I. M. (2003). «The social brain: Mind, language, and society in evolutionary perspective.» *Annual Review of Psychology*, 32, 163-181.
- EISENHARDT, K. M. and SANTOS, F. M. (2002). «The Knowledge-based View: A New View of Strategy», in Pettigrew, A., H. Thomas, and R. Whittington, eds., *Handbook of Strategy and Management*. London: Sage.
- ELSTER, J. (1989). *Nuts and Bolts for the Social Sciences*. Cambridge: Cambridge University Press.
- FELDMAN, B. T. and PENTLAND, M. S. (2003). «Reconceptualizing Organizational Routines as a Source of Flexibility and Change». *Administrative Science Quarterly*, 48:
- FEHR, E. and ROCKENBACH, B. (2003). «Detrimental effects of sanctions on human altruism». *Nature*, 422: 137-140.
- FELIN, T. and FOSS, N. J. (2005). «Strategic Organization: A Field in Search of Micro-foundations». *Strategic Organization* 3: 441-455.
- FELIN, T. and HESTERLY, W. S. (2007). «The Knowledge-Based View, Nested Heterogeneity, and New Value Creation: Philosophical Considerations on the Locus of Knowledge». *The Academy of Management Review* 32: 195-218.

- FOSS, N. J. and ERIKSEN, B. (1995). «Industry Capabilities and Competitive Advantage», in Cynthia A. Montgomery, ed. 1995. *Evolutionary and Resource-based Theories of the Firm*. Boston: Kluwer.
- FOSS, K. and FOSS, N. J. (2005). «Value and Transaction Costs: How Property Rights Economics Furthers the Resource-based View». *Strategic Management Journal* 26: 541-556.
- FOSS, N. J.; HUSTED, K. and MICHAILOVA, S. (2010). «Governing Knowledge Sharing in Organisations: Levels of Analysis, Governance Mechanisms, and Research Directions», *Journal of Management Studies* (forthcoming).
- GAVETTI, G. (2005). «Cognition and Hierarchy: Rethinking the Microfoundations of Capabilities' Development», *Organization Science* 16: 599-617.
- GHOSHAL, S. and NAHAPIET (1998). «Social Capital, Intellectual Capital, and the Organizational Advantage». *The Academy of Management Review*, 23: 242-266.
- GHOSHAL, S. and TSAI, W. 1998. «Social Capital and Value Creation: The Role of Intra-firm Networks», *Academy of Management Journal* 41: 464-476.
- GOTTSCHALG, O. and ZOLLO, M. (2007). Interest alignment and competitive advantage. *Academy of Management Review*, 32: 418-437.
- GRANDORI, A. and KOGUT, B. (2002). «Dialogue on Organization and Knowledge». *Organization Science* 13: 224-232.
- GRANOVETTER, M. (1973). «The Strength of Weak Ties». *American Journal of Sociology* 78: 1360-1380.
- GRANT, R. M. (1996). «Towards a knowledge-based theory of the firm». *Strategic Management Journal* 17: 109-122.
- GUPTA, A. K.; TESLUK, P. E. and TAYLOR, M. S. (2007). «Innovation At and Across Multiple Levels of Analysis», *Organization Science* 18: 885-897.
- HANSEN, M. T. (1999). «The Search-Transfer Problem: the role of weak ties in sharing knowledge across organizational subunits». *Administrative Science Quarterly* 44: 82-111.
- (2002). «Knowledge networks: explaining effective knowledge sharing in multiunit companies». *Organization Science* 13: 232-248.
- HANSEN, M. T.; MORS, M. L. and LOVAS, B. (2005). «Knowledge sharing in organizations: multiple networks, multiple phases». *Academy of Management Journal* 48: 776-793.
- HAYEK, F. A. (1952). *The Counter Revolution of Science*. Chicago: University of Chicago Press.
- HEDSTRÖM, P. and SWEDBERG, R. (1996). «Social Mechanisms». *Acta Sociologica* 39: 281-308.
- (1998). «Social Mechanisms: An Introductory Essay». In P. Hedstrom and R. Swedberg (Eds.), *Social Mechanisms: An Analytical Approach to Social Theory*: 1-31. Cambridge: Cambridge University Press.
- HEIMERIKS, K. H. and DUYSTERS, G. (2007). «Alliance Capability as a Mediator Between Experience and Alliance Performance: an Empirical Investigation Into the Alliance Capability Development Process», *Journal of Management Studies* 44: 25-49.
- HEIMERIKS, K. H.; FELLIN, T.; FOSS, N. J. and ZOLLO (2010). «A Comparative Review of the Resource, Routines, and Capabilities Literatures: Similarities, Differences and a Proposed Agenda», *Working Paper*.
- HOLMSTRÖM, B. (1979). «Moral Hazard and Observability», *Bell Journal of Economics* 10: 74-91.
- (1989). «Agency Costs and Innovation», *Journal of Economic Behavior and Organization*, 12: 305-327.
- HOOPES, D. and MADSEN, T. 2008. «A Capability-based View of Competitive Heterogeneity», *Industrial and Corporate Change* 17: 393-426.

- JAANSSEN, M. (2006). «Microfoundations», accessible at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=901163
- KOGUT, B. and ZANDER, U. (1992). «Knowledge of the firm, combinative capabilities, and the replication of technology». *Organization Science* 3: 383-397.
- (1996). «What Firms Do? Coordination, Identity, and Learning». *Organization Science* 7: 502-517.
- KREPS, D. (1990). «Corporate Culture and Economic Theory». In J. Alt and K. Shepsle. 1990. *Perspectives on Positive Political Economy*. Cambridge: Cambridge University Press.
- KRUGLANSKI, A. W. and KÖPETZ, C. (2009). «What is so special (and non-special) about goals? A view from the cognitive perspective», In G. B. Moskowitz and H. Grant, eds. *The Psychology of Goals*. New York: Guilford Press
- LAZARSFELD, P. F. and MENZEL, H. 1970. «On the Relation Between Individual and Collective Properties», in Amitai Etzioni, ed. *A Sociological Reader on Complex Organizations*. London: Holt, Rinehart and Winston.
- LIBERMAN, V.; SAMUELS, S. M. and ROSS, L. (2004). «The name of game: Predictive power of reputations versus situational labels in determining prisoner's dilemma game moves», *Personality and Social Psychology Bulletin*, 30: 1175-1185.
- LINDENBERG, S. (1993). «Club hierarchy, social metering and context instruction: governance structures in response to varying self-command capital», in Lindenberg, S. and Schreuder, H. (Eds.) *Interdisciplinary Perspectives on Organization Studies*, Oxford: Pergamon Press, págs. 195-220.
- (2003). «The Cognitive side of Governance», *Research in the Sociology of Organizations* 20: 47-76.
- LINDENBERG, S. and FOSS, N. J. (2010). «Micro-foundations for Joint Production and Sustained Value Creation: A Goal-Framing Theory of the Firm», *Working Paper*.
- LIPPMAN, S. A. and RUMELT, R. P. (2003a). «A Bargaining Perspective on Resource Advantage». *Strategic Management Journal* 24: 1069-1086.
- (2003b). «The Payments Perspective: Micro-Foundations of Resource Analysis». *Strategic Management Journal*, 24: 903-927.
- MAKADOK, R. (2001). «Towards a Synthesis of the Resource-based and Dynamic Capabilities Views of Rent Creation», *Strategic Management Journal* 22: 387-404.
- MAKADOK, R. and BARNEY, J. 2001. Strategic Factor Market Intelligence: An Application of Information Economics to Strategy Formulation and Competitor Intelligence, *Management Science*, 47: 1621-1638.
- MÄKI, U. (2001). «The Way the World Works». In U. Mäki, ed. *The Economic World View: Studies in the Ontology of Economics*. Cambridge: Cambridge University Press.
- MCGRATH, J. E. and ARGOTE, L. (2001). «Group Processes in Organizational Contexts». In M. A. Hogg and R. S. Tindale, eds. *Blackwell Handbook of Social Psychology: Group Processes*. Oxford: Blackwell.
- MENGER, C. (1883). *Investigations into the Method of the Social Sciences with Special Reference to Economics*, Leipzig. English translation (1985) Louis Schneider (ed.), New York: New York University Press.
- MISES, L. V. (1949). *Human Action*. London: William Hodge.
- NELSON, R. R. and WINTER, S. G. (1982). *The Evolutionary Theory of the Firm*. Cambridge, MA: Harvard University Press.
- NICKERSON and ZENGER, T. (2004). «A Knowledge-based Theory of the Firm: The Problem Solving Perspective», *Organization Science*, 15: 617-632.
- NONAKA, I. (1994). «A Dynamic Theory of Organizational Knowledge», *Organization Science* 5: 14-37.
- NONAKA, I.; TOYAMA, R. and HIRATA, T. (2008). *Managing Flow: A Process Theory of the Knowledge-based Firm*. London: Palgrave MacMillan.

- OSTERLOH, M. and FREY, B. (2000). «Motivation, Knowledge Transfer and Organizational Form». *Organization Science*, 11: 538-550.
- POPPER, K. R. (1957). *The Poverty of Historicism*. (Reprint 1999). London: Routledge.
- PSILLOS, S. (1999). *Scientific realism: How science tracks truth*. London: Routledge.
- REAGANS, R. and McEVILY, B. (2003). «Network Structure and Knowledge Transfer: the Effects of Cohesion and Range». *Administrative Science Quarterly* 48: 240-267.
- REINHOLT, M.; PETERSEN, T. and FOSS, N. J. 2010. «Why Network Centrality Isn't Enough: The Role of Motivation for Knowledge Sharing in Employee Networks», *Working Paper*.
- ROTHAERMEL, F. T. and HESS, A. M. (2007). «Building Dynamic Capabilities: Innovation Driven by Individual-, Firm-, and Network-level Effects», *Organization Science* 17: 898-921.
- ROWLINSON, M. (1993). «The Invention of Corporate Culture: The History of the Histories of Cadbury». *Human Relations*, 46: 299-326.
- RYAN, R. M.; HUTA, V. and DECI, E. L. (2008). «Living well: A self-determination theory perspective on Eudaimonia». *Journal of Happiness Studies*, 9: 139-170.
- SCHEIN, E. (1982). *Organizational Culture and Leadership*. San Francisco: Jossey-Bass.
- SEBANZ, N.; BEKKERING, H. and KNOBLICH, G. (2006). «Joint action: bodies and minds moving together». *TRENDS in Cognitive Science*, 10:70-76.
- SHAH, J. Y.; FRIEDMAN, R. and KRUGLANSKI, A. W. (2002). «Forgetting all else: On the antecedents and consequences of goal shielding.» *Journal of Personality and Social Psychology*, 83: 1261-1280.
- SHIPTON, H. J.; WEST, M. A.; PARKES, C. L.; DAWSON, J. F. and PATTERSON, M. G. (2006). «When promoting positive feelings pays: Aggregate job satisfaction, work design features, and innovation in manufacturing organizations.» *European Journal of Work and Organizational Psychology* 15, 404-430.
- SILBERSTEIN, M. (2002). «Reduction, Emergence and Explanation», in Peter Machamer and Michael Silberstein, eds. *The Blackwell Guide to the Philosophy of Science*. Oxford: Blackwell Publishers.
- SIMON, H. A. (1991). «Bounded Rationality and Organizational Learning», *Organization Science* 2: 125-134.
- SPENDER, J. C. (1996). «Making Knowledge the Basis of a Dynamic Theory of the Firm». *Strategic Management Journal* 17 (Winter Special Issue): 45-62.
- STINCHCOMBE, A. (1991). «The Conditions of Fruitfulness of Theorizing About Mechanisms in Social Science», *Philosophy of Social Science* 21: 367-388.
- TALLMAN, S. (2003). «The Significance of Bruce Kogut's and Udo Zander's article, 'Knowledge of the firm and the evolutionary theory of the multinational corporation'», *Journal of International Business Studies* 34: 495-497.
- TEECE, D. J. (2007). «Explicating Dynamic Capabilities: The Nature and Micro-foundations of (Sustainable) Enterprise Performance», *Strategic Management Journal*.
- TEECE, D. J.; PISANO, G. and SHUEN, A. (1997). «Dynamic Capabilities and Strategic Management». *Strategic Management Journal* 18: 509-534.
- TSAI, W. (2001). «Knowledge Transfer in Intraorganizational Networks: Effects of Network Position and Absorptive Capacity on Business Unit Innovation and Performance». *Academy of Management Journal* 44: 996-1004.
- TSOUKAS, H. and VLADIMIROU, E. (2001). «What is Organizational Knowledge?», *Journal of Management Studies* 38: 973-993.
- VOLBERDA, H.; FOSS, N. J. and LYLES, M. (2010). «Absorbing the Concept of Absorptive Capacity: How To Realize Its Potential in the Organization Field», *Organization Science* (forthcoming).
- WILLIAMSON, O. E. (1985). *The Economic Institutions of Capitalism*. New York: The Free Press.
- (1996). *The Mechanisms of Governance*. Oxford: Oxford University Press.

- WINTER, S. G. (1987). «Knowledge and Competence as Strategic Assets». In Teece, D.J., ed. *The Competitive Challenge*. Cambridge, MA: Ballinger.
- (2001). «The Satisficing Principle in Capability Learning», *Strategic Management Journal* 21: 981-996.
- (2003). «Understanding Dynamic Capabilities», *Strategic Management Journal* 24: 991-995.
- WRIGHT, P. M.; DUNFORD, B. M. and SNELL, S. A. 2001. «Human Resources and the Resource-based View of the Firm», *Journal of Management* 27: 701-721.
- ZENGER, T. R. (1993). «Explaining Organizational Diseconomies of Scale in R&D: The Allocation of Engineering Talent, Ideas, and Effort by Firm Size». *Management Science*, 1994, 40(6): 708-729.