Alternative Research Strategies in the Knowledge Movement: From Macro Bias to Micro-Foundations and Multi-Level Explanation

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Abstract

The emergence over the last two decades or so of "knowledge" as an important part of the explanatory structure of management research is an intellectual breakthrough that is comparable in terms of its transforming impact to the behavioral revolution of the 1960s. A veritable "knowledge movement" has emerged that spans several fields in management. I take stock on alternative research strategies with that movement, distinguishing between "capabilities first", "networks first" and "individuals first" strategies. Reasons are given why more research attention need to be allocated to the latter strategy if the knowledge movement is to continue making progress, but that the aim should ultimately be to reach towards multi-level research that combines aggregate constructs with top-down processes and bottom-up processes.

INTRODUCTION

Management research comprises a set of largely young fields characterized by a high degree of heterogeneity in terms of explanatory stances, assumptions, heuristics, and methods. Partly because of this heterogeneity, there have been few changes in management research that are even remotely comparable to Kuhnian revolutions, in the sense of radically changing the fundamental outlook, assumptions, methods, etc. of scholars. It is hard to basically shake an intellectual structure characterized by extreme diversity in terms of assumptions, methods and insights. The advent of the behavioral approach in the 1950s may be invoked as coming close to effecting such a momentous change, leaving permanent traces everywhere in management research, from marketing over strategic management and organization theory to finance. While the behavioral approach implied new fundamental conceptualizations of individuals and organizations (March & Simon, 1958; Cyert & March, 1963), it also offered research heuristics, specifically ways of exploring and modeling the many individual and organizational level ramifications of starting from the notion that individuals are bounded rational but may engage in search to move the bounds of their rationality. Offering what comes close to a "full package" of assumptions, heuristics, and insights may have been an important factor behind the success of the behavioral approach.

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 behavorial approach, and the purpose of the present paper is to map and discuss the dominant research strategies that have been adopted to deal with "knowledge". Although the notion of "knowledge management" has become a much used overall label, the reach of what Eisenhardt and Santos (2002) very fittingly call the "knowledge movement" goes much beyond the more narrow field of knowledge management (Nonaka, 1994; Spender, 2005), manifesting itself major 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 brought to management research 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 ("capabilities", whether "dynamic" or not, "competencies", "routines", "knowledge sharing", "knowledge integration", "absorptive capacity" etc.); new dimensionalizations (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; Arora & Gambardella, 1994; Teece, Pisano & Shuen, 1997; Denrell, Fang & Winter, 2003; Brusoni et al., 2007).

The links between the behavioral approach and the knowledge movement go beyond the similarity in terms of impact. Indeed, a synthesis between behavorial and KM ideas has gradually taken form, becoming highly influential in the management fields mentioned above (e.g., Cohen & Levinthal, 1990; Gavetti & Levinthal, 2002; Winter & Szulanski, 2001; Zollo & Winter, 2003). The overall reason is that in their attempts to operationalize behavioralist ideas, scholars have increasingly emphasized firm-level *experience* (Felin, 2008), which has an obvious overlap with "capabilities" and other constructs that are intended to capture specialized, firm-level knowledge and are central constructs in the knowledge movement. However, this emerging synthesis has in at least one very important respect not been faithful to its original sources: The behavioralists (Simon, 1947; March & Simon, 1958; Cyert & March, 1963) were explicitly critical of attempts to reify organizations (and per implication organization-level constructs). They were, in fact, insistent on the need to begin theory-building from foundations rooted in assumptions about individuals (Felin & Foss, 2009). In terms of its implications for the knowledge research lens, such an emphasis on micro-foundations means at least two things: First, firm-level constructs such as capabilities must be rooted in assumptions about individuals and their interaction; second, the impact of these constructs on firm-level outcomes must be shown to be mediated by individuals and their interaction (Abell, Felin & Foss, 2008). However, it is only very recently that explicit attention, mainly in strategic management and organizational theory, has been paid to the need for micro-foundations (Foss, 2003, 2007; Felin & Foss, 2005; Gavetti, 2005; Felin & Hesterly, 2007; Teece, 2007), and most work so far has been content with pointing out the need rather than showing in the concrete what micro-foundations may look like.

At the same time, however, that strategic management and organizational scholars have called for micro-foundations, more micro-oriented work has been done on knowledge networks (Hansen, 1999, 2002; Hansen, Løvas & Mors, 2005)) and, particularly, the motivational aspects of knowledge processes (Osterloh & Frey, 2000; Cabrera & Cabrera, 2002; Foss et al., 2008). Thus, different research strategies exist within the knowledge movement and a stock-taking and assessment of these, to be performed in the following, seems warranted. Although I shall argue that the micro-level of individuals and interaction has been comparatively neglected and in certain specific ways holds ontological and explanatory primacy, the aim is not to press the claim that this level can entirely substitute other levels. Rather, research in the knowledge movement should strive for multi-level

research that carefully defines variables at alternative levels and investigates the links between those (i.e., *mereologies* should be built).

RESEARCH STRATEGIES IN THE KNOWLEDGE MOVEMENT

Origins and Sources

The advent of the knowledge lens has arguably been driven by changes in the economy that have been discussed too often to bear yet another rehearsal (see Mokyr, 2002; Foss, 2005: chapter 1). Note in passing that the source disciplines of management research, notably economics and sociology, have also increasingly emphasized the role of knowledge, as witness, for example, the "new" growth theory (Romer, 1990) in economics, and knowledge networks in sociology (Burt, 1992), and probably prompted by the same phenomenal drivers that help explaining the emergence of the knowledge movement in management research from around 1990. However, rather than deriving inspiration from such developments in the source disciplines, the current knowledge movement in management has reached back to earlier and partly overlapping developments in the behavioralism, and in evolutionary, Schumpeterian, and Austrian economics, as well as innovation studies and technology policy, spiced up with insights from cognitive science on the embedded nature of cognition and insights from epistemology on the tacit nature of knowing.

Thus, the emphasis on bounded rationality and search (Nelson & Winter, 1982; Gavetti & Levinthal, 2000; Tripsas & Gavetti, 2000) reaches back, of course, to the behavioral tradition (March & Simon, 1958; Cyert & March, 1963); the notion that the main locus of knowledge lies at the level of the firm (as captured by the capabilities construct) and that productive knowledge is largely tacit and stored in routines and capabilities are key notions in the evolutionary theory of the firm (Nelson & Winter, 1982); the insight that knowledge development is localized and embedded has been emphasized in innovation studies for a long time (e.g., Rosenberg, 1976) and may even have a precursor in parts of Austrian economics (Hayek, 1945); the notion of "dynamic capabilities" is indebted to the product development literature of the 1980s as well as the innovation literature more generally; the general emphasis on process and dynamics is indebted to evolutionary economics and Schumpeterian and Austrian influences in economics (Schumpeter, 1911); etc.

Knowledge as *Explanans* and *Explanandum*

It is highly questionable whether the above diverse influences "add up" in the sense of constituting a coherent whole, and trying to reconstruct the knowledge movement as anything like a Lakatosian research program with a hard core, positive and negative heuristics, predicting "novel

facts", etc. (Lakatos, 1970), or even a Kuhnian paradigm is at any rate a futile task. The knowledge movement is, however, 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 defining characteristic of the knowledge movement in management is that it has expanded the set of *explananda* (what should be explained) and *explanantia* (the explanatory apparatus). However, in sound explanation (beyond correlation) these variables are obviously linked by explanatory mechanisms (Machamer, Darden & Craver, 2000); and, as I shall argue, the knowledge movement has been less successful in identifying, theoretically as well as empirically, those causal mechanisms that are a necessary part of the *explanans*.

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). The investigation of patent-activity and its determinants have become a burgeoning research activity (e.g., Almeida, Song & Grant, 2000), overlapping with economics and attractive to those who despair over the lack of objective measures of knowledge-related variables, and the relative paucity of scales or the inadequacy of existing ones, in the knowledge movement.

In terms of knowledge as 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, 2009). 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, as indicated, to reduce virtually all knowledge-related antecedents to firm-level experience that has 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. However, other scholars in the knowledge movement do not make firm-level experience the central (or sole) analytical vehicle of their research. Instead, they adopt more disaggregated approaches, looking at intra-organizational knowledge networks, or how the deployment of HRM practices impact knowledge-related behaviors (e.g., knowledge sharing) (Collins & Smith, 2006). These efforts, perhaps inspired more by organizational behavior, HRM, and even organizational economics, may be less conspicuous in the overall picture of the knowledge movement. However, they represent a radically different approach to building theory within the knowledge movement.

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.[1] 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

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

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 strategies—for simplicity called "Capabilities First," "Networks First," and "Individuals First"—within the knowledge movement; see Table 1.[2]

Insert Table 1 Here

Strategy 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 reasons for its strong influence, even dominance, in a number of fields in management research (particularly strategic management). For example, the emphasis on the embedded or situated nature of knowledge in firms, and therefore its localized and path-dependent features are important contributions. Even those who argue that ultimately organizational knowledge resides within the heads of individuals (Simon, 1991; Grant, 1996; Felin & Hesterly, 2007) presumably will not deny that individually held knowledge is shaped through localized social processes that may influence

[2] This taxonomy of research strategies arguably is not exhaustive. Thus, I abstract from the "tool"-oriented research strategies in the following, mainly because these are borderline between management research and ITC research. I similarly abstract from those parts of the knowledge movement which focus on groups as the unit of analysis, e.g., Thomas-Hunt, Ogden, and Neale (2003) and Kane, Argote and Levine (2005). Some parts of the knowledge management field may also be hard to press into any of the three strategies for other reasons (e.g., Nonaka, 1994; Nielsen & Nielsen, 2009).

knowledge development and deployment in specific directions and that in this sense much productive knowledge is indeed embedded and situated. However, contributors to the "capabilities first" stream of research typically go further than this and 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). The argument that productive knowledge resides mainly at the firm level 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). In the case of strategic management, the reason arguably has to do with the dominant resource-based analytics of sustained competitive advantage: Resources that are complex and social and which have emerged through firm-specific historical processes—such as capabilities—are often argued on *apriori* grounds to be the dominant (only?) causes of sustained competitive advantage (Dierickx & Cool, 1989; Barney, 1991). The argument is highly problematic (Barney, 1989)—there is, for example, no *apriori* reason that human capital cannot be a source of sustained competitive advantage—, and at any rate does not provide any license for bypassing entirely the level of individuals. However, the notion that knowledge in firms resides at collective levels has become a starting point for analysis, rather than an empirical proposition—although significant evidence of important productive knowledge residing at the level of individuals certainly exists.[3] This is in keeping with the strong tendency to take macro variables or constructs, such as capabilities, routines, absorptive capacity, etc., as explanatory *primitives* (see Pentland & Feldman [2005] for an illustrative treatment). There is nothing necessarily wrong with beginning analysis from macro variables. For example, economists routinely begin analysis of countries' growth experiences from the institutional set-up of these countries. However, they are acutely aware that the "transmission mechanism" from institutions to growth is one that goes over individuals and their interaction. Moreover, the relevant institutions are often explained in economics in a functionalist mode as serving the interests of individuals. Precisely because economists have

[3] For example, Brown, Engeström and Koistonen (1990) discussed an urology clinic where most of the relevant organizational knowledge resided in one administrator; Salvato (2007) showed how the dynamic capabilities of Alessi are embedded in the CEO; Lacetera, Cockburn, and Henderson (2004) described how capabilities may change as a result of individual scientists leaving or joining firms; Starbuck (1992) argued that productive knowledge is largely stored in the heads of individuals members in professional service firms; etc.

well-developed (though one-sided) accounts of these mechanisms, they are often not explicitly described in applied work.[4]

Note the dual argument being made here: Economists have micro-foundations for institutions, as well as for the link between institutions and macro-outcomes. In contrast, scholars who practice the capabilities first approach in management have neither! First, although management scholars have examined antecedents of capabilities (e.g., Winter, 2001, 2003; Pentland & Feldman, 2005), the relevant antecedents are placed on the macro level (e.g., routines antecede capabilities), and there are no systematic accounts in the management research literature of how capabilities may emerge from the actions and interactions of individuals (Felin & Foss, 2005). Moreover, there are no serious accounts of how the effects of capabilities on firm-level outcomes are mediated by the actions and interactions of individuals (Abell, Felin & Foss, 2008).[5] It seems clear that the building blocks of capabilities are routines. However, this may not assist the understanding of capabilities much because so much is packed into the notion of organizational routine, notably organizational processes and arrangements, cognitive issues (e.g., "organizational memories"), and reward systems ("truces"). Not surprisingly, empirical work on routines and capabilities (and their many aliases and neighboring concepts) is predominantly mono-level (Gupta, Tesluk & Taylor, 2007). Thus, there are few and more likely no mereologies (i.e., theoretical accounts of the mechanisms that links levels) in the capabilities first approach, because of the overriding emphasis on firm-level variables and links between these.

From a basic philosophy of social science perspective, 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?

[4] Cf. Stinchcombe (1991: 379-380): "[w]here there is rich information on variations at the collective or structural level, while individual-level reasoning (a) has no substantial independent empirical support and (b) adds no new predictions at the structural level that can be independently verified, theorizing at the level of [individual level] mechanisms is a waste of time."

[5] For this reason, Foss (2003b) argues that the capabilities literature largely pays lip service to bounded rationality. See also Felin and Foss (2009a).

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 (for a similar critique of work on absorptive capacity, see Volberda, Foss & Lyles, 2009).

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.

Strategy 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 placed upon it!

Characteristically, significant analytical progress, beyond taxonomy, 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. Specifically, 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; Uzzi & Gillespie, 2002; 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. A plethora of measures of these properties has been advanced in the literature. In particular, centrality in its many forms is emphasized as an important structural antecedent of knowledge acquisition and performance (Burt, 1992; Hansen, 2002; Tsai, 2001).

However, the network literature tends to place a large explanatory burden on centrality (and other other structural measures). Thus, 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 (2008) argue that insights in motivation need to be integrated with network measures to better understand knowledge sharing in organizations. In a nutshell, they 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, 2002, 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.

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

Strategy 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. Such a starting point may be motivated ontologically ("ultimately, only individuals act"), explanatorily ("understanding the fundamental cogs and wheels of what happens in organizations requires beginning from their fundamental constituents, namely individuals"), or pragmatically ("management ultimately means intervening at the level of individuals"). Such starting points are associated with "methodological individualism" (e.g., Coleman, 1990), and the notion that explanation involves accounting for phenomena in terms of mechanisms that are typically located at levels lower than those of the relevant phenomena (Elster, 1989).

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). Grant, however, still sees "context" as shaping individual actions and argue that "capabilities" emerges from interaction among individuals.

Felin and Hesterly (2007) is the strongest and most uncompromising statement of the (or rather a) individualist approach in the organizational literature. At times Felin and Hesterly seem close to a denial of the very meaningfulness of thinking of the organizational level as a possible locus of knowledge. Instead, they argue, what drives seemingly organization-level phenomena (e.g., firm-level heterogeneity) is in actuality processes of individuals with certain characteristics self-selecting into certain organizational environments. Thus, organizational knowledge is really an epiphenomenon of individuals with certain skills and knowledge; the true locus of knowledge is strictly individual. Read (perhaps too) literally, Felin and Hesterly seem to claim that there are no or few knowledge externalities between employees; firm performance is entirely driven by human capital, and perhaps the formal organizational apparatus that deploys human capital and calls forth the services of such capital. There is nothing in their model that seems to speak to social capital

issues, social embeddedness, etc. This may be too extreme for most. In fact, the individuals first approach by no means excludes a concern with social context and it does not rule out collective or aggregate concepts (though insisting that such concepts be reducible to the actions and interactions of individuals), or even their use in explanation (cf. Little, 1998; Abell, Felin & Foss, 2007). However, the proper way to understand their paper is probably, first, as an antidote to equally strong, but completely different, positions that all that matters is organizational context (i.e., the "strong situation" argument, ref.), second, as a call for empirically looking at self-selection processes, and, third, as a general call for paying considerably more attention to the individual factor—that is, which individuals with which characteristics are employed, turn over, run the firm, etc.

Thus understood the individuals first approach links up with several extant and rather diverse literatures that are all, however, characterized by a concern with individuals with different motivations and abilities, facing different opportunities, such as the human resource management and organizational behavior literatures, as well as the very different organizational and labor market economics literatures. Thus, in contrast to the capabilities first and the networks first approaches, the individuals first approach draws on more diverse literatures. This may have contributed to making the individuals first approach a distinct minority position within the knowledge movement, certainly within organizational and strategic theory. Yet, a number of contributions do exist that may be taken to exemplify an individuals first approach, such as Zenger's (1993) 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) elegant linking of motivational assumptions about individuals, organizational incentives, and competitive advantage; and Rothaermel and Hess' (2007) sophisticated multi-level exploration of innovation capabilities.

WHY MICRO-FOUNDATIONS?

The Macro Bias in the Knowledge Movement

Hitherto, research in the knowledge movement has been at least strongly influenced, and perhaps even 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. Until the existence of a macro bias is

documented by bibliometric (or less rigorous) methods, the claim of such a bias must remain just that. However, some indications do exist of a macro bias. As the editors of a recent issue on multi-level issues in organizational theory (Gupta, Tesluk & Taylor, 2007) observed, most work on the knowledge/organization nexus is mono-level (namely, macro-level). For example, Volberda, Foss and Lyles (2009) provide bibliometric evidence of a macro bias in extant research on absorptive capacity: Most antecedents of absorptive capacity in the literature can be classified under the heading of prior, related, and *firm-level* knowledge.

At issue is, however, whether this macro-bias is inherently problematic. It is possible to condemn, for example, the capabilities first approach on methodological grounds: To the extent that it is asserted that there links between macro-constructs that are not mediated by individuals and their interaction or (weaker) that individuals can inherently be disregarded in favor of macro constructs because individuals are fully malleable by context, then it seems reasonable to indict such assertions as breaking with fundamental explanatory principles, as well as existing empirical knowledge (cf. Felin & Foss, 2005). Similarly, while working with macro constructs as part of the *explanans* of a theory may not be inherently problematic on methodological grounds (Agassi, 1975; Little, 1998; Morgeson & Hoffman, 1999), it is still preferable to only make use of macro constructs that can be grounded in the actions and interactions of individuals. It is, in fact, quite arguable that this isn't the case of a number of the central macro constructs in the knowledge movement, notably capabilities (Felin & Foss, 2005) and absorptive capacity (Volberda, Foss & Lyles, 2009).

Why the Macro Bias is Problematic

Still, it is also important to recognize the inherently imperfect and preliminary nature of research efforts, not the least empirical ones. For example, it would be silly to condemn and impose a moratorium on the notion of firm-level "capability" just because it is currently not clearly related to any solid micro-foundations. Capability may serve as useful shorthand for a complex set of complementary relations between firm-specific human capital, and as a reminder of the partly situated and embedded nature of cognition in firms. Moreover, familiar level of analysis issues are involved here (Dansereau & Yammarino, 2005): For example, for the purposes of analysis at the industry level—such as tracing the effects of product prices of changes in input prices—one can make do with a simplified view of the firm and its internal workings. The capabilities first approach may not be far off the mark in such a setting; paying attention to individuals might be a distraction, because what matters are firms' (differential) behaviors in markets (Nelson & Winter, 1982: Chpt. 6). Empirically, it may therefore make little sense to sample on the level of individuals. In particular,

from a capabilities first perspective, interest centers on firm-level responses as determined by firm routines and capabilities.

However, this interpretation of the tradeoff between richness of description and the level of analysis (e.g., Machlup, 1967; Dansereau & Yammarino, 2005) is, while a standard one, also highly problematic. For example, the spawning literature (e.g., Gompers, Lerner & Sharfstein, 2005) and more generally the emerging fusion of entrepreneurship and labor market economics (e.g., Parker, 2004) suggest that industry-level knowledge-related outcomes, such as the formation of new entrepreneurial ventures and therefore overall innovativeness, may be intimately related to individual level matching processes and the incentives that individuals face. This suggests that understanding industry-level outcomes may ultimately require that close attention are paid to individual skills and that a fine-grained view are taken of organizations; routines and capabilities are simply too aggregate units of analysis for a number of purposes. For example, a long-standing discussion of the relative advantages of large and small firms in innovation seems to have led to the conclusion that empirically the latter enjoy special advantages, although the nature of these advantages is somewhat ill-understood. Zenger and Lazzarini (2004) suggest that smaller firms are better positioned to create incentive-intensive employment contracts that call forth high efforts and lure particularly talented employees. While aspects of their story may perhaps be placed under a capability heading (e.g., the role of administrative heritage in making it difficult for large firms to offer competitive compensation packages), little seems to be gained by adding this macro-construct, and the real analytical action lies in looking at the role of incentives in matching specific employees with functions as well as incentives.

Examples of Added Value from a Micro Perspective

The innovation-firm size example indicates that added explanatory value may emerge from adopting micro perspectives that place individuals centrally. Thus, Zenger and Lazzarini point to the mechanisms of how incentives induce efforts and attract individuals, that is, "… bits of theory about entities at a different level (e.g., individuals) than the main entities being theorized about (e.g., groups)", and this serces "to make the higher-level theory more supple, more accurate, or more general" (Stinchcombe, 1991: 367). In general, the criterion for "… whether it is worthwhile to theorize at lower levels is whether it makes the theory at the higher levels better, not whether lower-level theorizing is philosophically necessary" (idem). A few more examples in this spirit are offered in the following.

Managing knowledge work. While the macro bias in large parts of the literature on knowledge in organizations may lead researchers astray in a number of ways, this is perhaps particularly so in the case of managing efforts that are intelligent and adaptative, that is, a very significant part of management under modern knowledge-intensive conditions. As Lindenberg (2003) forcefully argues, organizations should primarily be seen as structured attempts to mobilize and sustain joint production. He suggests that there exists strong evidence in evolutionary psychology that the cognitive and motivational apparatus of human beings is adapted to deal with the subtleties of the coordination of intelligent effort of many individuals for a common goal, but that behaving in solidary ways is by no means guaranteed (Fehr & Gächter, 2002). He is careful to emphasize that the sustainability of the behaviors that lead to joint production rests on its being in the service of *individual* adaptive advantages (Dunbar, 2003). Managing intelligent, adaptive efforts therefore go very much beyond having people identify with the goals of the organization, and calls attention to the details of the management of cognitions and motivations (cf. also Osterloh & Frey, 2000; Grandori, 2001).[7]

To a certain extent similar reasoning may be framed by standard agency theory; thus, knowledge sharing, creating, and integrating behaviors are likely to be particularly difficult to measure and reward (Holmström, 1989), as both input and output measures may be very noisy. However, agency theory has relatively little to say concretely about how managers should react to these difficulties, although the theory may be taken to imply that for the sake of measurement, it may be worthwhile to seek to *standardize* knowledge work to a significant extent (as in many consultancies and professional service firms), and to seek to maximize the division of labor in such work (Prendergast, 2009).

The organization of knowledge work. A major benefit of an individuals first approach is not just the added insight in knowledge-related behaviors it yields, but also the improved understanding of the aggregate ramifications of such behaviors. Consider again the starting point for much current thinking on organization of knowledge work, that is, that such work may be hard to measure and therefore raises particular challenges regarding the management of rewards and cognitions. Organizational and HRM scholars have argued that the advent and increased prevalence of knowledge-based organizations may be differentiated from "traditional" firms in terms of governance mechanisms by relying less on direction through the exercise of authority, eschewing high-powered performance incentives, and embracing "culture" and "clan" modes of organizational control (at least for the core group of employees) (e.g. Child and McGrath, 2001). However, Teece

[7] In fact, Lindenberg (2003) further suggests that the management of cognitions is causally primary.

(2003) develops a completely contrary view. Teece explains how the organization of a firm founded by himself (Law and Economics Consulting Group, LECG), a professional services firm, is very much different from the above portrayal of how human capital organizations are administered and controlled. In particular, while indeed the traditional blunt authority-mechanism (supervision, order-giving) is "extremely weak" in this firm, very high-powered performance incentives are used (instead). The two features are related, for by setting compensation for "experts" "… purely as a certain percentage α of the expert's own individual bill-out rate times hours worked (as accepted by the client)" (Teece 2003: 909), strong incentives are coupled with a small need for monitoring. Teece speculates that the specific organizational design of LECG (and there are other features in addition to those briefly mentioned here) "… may well portend the future for professional service organizations endeavouring to leverage top talent" (p. 914).

The point here is not that Teece is right and those who argue differently are wrong, or *vice versa*. Both may be right—for different kinds of organizations or for different environments. The problem is rather that we do not have a good theory that will allow us to discriminate between these alternative accounts in a clean manner. Such a theory would start from a knowledge-related unit of analysis and explain how the efficient deployment of governance mechanisms systematically varies when the unit of analysis varies, given assumptions about agents' knowledge and motivation and given assumptions about the principle (e.g., efficiency) that links the unit of analysis with alternative kinds of governance mechanisms (or combinations thereof) (Foss, 2007).

Units of analysis and their dimensions, and organization. While the absence of a clear unit of analysis in the knowledge movement has been criticized (Williamson 1999), it should also be recognized that disciplines, fields, or approaches are not necessarily characterized by unique units of analysis. Thus, the existing diversity may reflect that different research problems are involved. The unit may differ depending on whether the focus is knowledge sharing, integration, or creation. However, the relevant units should be placed on the micro level and be clearly related to the actions of individuals. One such unit is the knowledge transaction, that is, the transfer of an identifiable "piece" of knowledge from one individual to another one. Knowledge transactions are involved in knowledge sharing, integration, and creation. Note that taking the knowledge transaction as unit of analysis has the added benefit of linking up with organizational economics and an established framework for linking transactions to alternative kinds of organizing.

However, the way of dimensionalizing transactions that has become dominant in organizational economics, namely the transaction cost economics triad of frequency/uncertainty/asset specificity, seems incomplete for the purposes of treating knowledge transactions (cf. Grandori, 2001; Nickerson

and Zenger, 2004). Beginning with Winter (1987), much work has been invested in developing dimensions of knowledge within the knowledge movement. Read through a micro-perspective lense (rather than a capabilities first one), Winter's dimensions (i.e., of tacitness vs. explicitness, system-quality vs. stand-alone, teachability vs. non-teachability, and complexity vs. non-complexity) complement the TCE triad. The import of a dimensionalization of the unit of analysis is that the costs of sharing, integrating, and creating knowledge vary systematically with the relevant dimensions, and that the deployment of governance mechanisms to curb such costs should take this into account.

By application of standard transaction cost logic (Williamson, 1996), knowledge transactions give rise to organizational hazards and costs depending on how they score in terms of the above dimensions. This opens the door for a knowledge-based theory of economic organization (cf. also Grandori, 2001). Thus, Foss (2007) characterizes "knowledge governance" as an examination of how knowledge transaction—which differ in their characteristics—and governance mechanisms—which differs with respect to how it handles transactional problems—, are matched, using economic efficiency as the explanatory principle and given behavioural assumptions. As a practical and normative enterprise, knowledge governance means deploying governance mechanisms that mitigate costs of sharing, integrating and creating knowledge owing to the above characteristics of knowledge (Heiman and Nickerson 2002: 98). Work on this is still in its infancy. Some inspired beginnings in this respect are Grandori (2001), Heimann and Nickerson (2004), and Contractor and Ra (2002).

TOWARDS MULTI-LEVEL RESEARCH IN THE KNOWLEDGE MOVEMENT

The time seems ripe for launching a sustained micro-oriented research effort within the knowledge movement, as there are indications that management scholars in general increasingly seem dissatisfied with mono-level, macro theories. Thus, scholars increasingly call for multi-level theory and methods (Dansereau & Yammarino, 2005), which would seem to have as a natural consequence that considerably more attention be paid to micro than has hitherto been the case in many management fields. On the theory side, prominent scholars, particularly in strategic management, have increasingly often called for micro-foundations, whether explicitly (e.g., Teece, 2007) or more implicitly (Coff, 1999; Lippman & Rumelt, 2003). This momentum may be exploited by scholars in the knowledge movement. However, fundamental issues need to be discussed and clarified. For example, what is exactly meant by "micro-foundations," how is micro and macro connected, and what are the implications for research practice, including methods? These are all huge and separate points for discussion, so only a highly sketchy account is feasible in the context of a brief perspective paper.

Which Micro Foundations?

Calling for micro-foundations is the easy part; building those foundations is much harder. Part of the problem is that some parts of management research abounds in thinking about individuals (consumer research and organizational behavior are the obvious examples), while other parts are virtually "individual'less" (e.g., population ecology). This goes even for important parts of strategic management and organizational theory with which the knowledge movement may be particularly closely associated. For example, while strategic management scholars have spent much time discussing strategic choice versus determinism, there is no model of man in strategic management that underlie this discussion. Instead, behavioral assumptions—whether drawn from economics (Lippman & Rumelt, 2003) or behavioralism (Zollo & Winter, 2003; Gavetti & Levinthal, 2005)—are invoked in an *ad hoc* manner, namely to support specific arguments designed to throw light on specific problems. As long as social science does not possess a unified model of man, this practice is likely to continue.

The existing repertoire of cognitive and motivational assumptions in management research have been borrowed from very different sources, such as the economics model of man, behavioralism and its more or less distant offsprings (e.g., work on routine and rule following), the related heuristics and biases literature, and all sorts of insights from social and motivational psychology. A significant part of this repertoire has arisen and been applied as a critical reaction to economics models, specifically as a critical reaction to the very stylized and anonymous model of the agent in economics (cf. Simon, 1955; Cyert and March, 1963), and as attempt to add greater descriptive realism to the analysis of the firm and other organizations as well as to the human agents populating them. Much of this is surely laudable and useful (even if the economics approach to understanding human behavior may have changed dramatically over the last decade). However, 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. The problem is that in behavioral models, agents are hard-wired to choose certain courses of actions.[8] This means that it is difficult to truly account for innovativeness (Bianchi, 1990). Moreover, behavioralism in management has had difficulties coming to grips with motivation which

[8] As Langlois and Csontos (1993: 118, 121) argue, "… behavioralists tend to assume that agents are (1) hard-headed rule followers or (2) pre-programmed satisficers *ab ovo*." An agent who is programmed [i.e., the behavioralist agent] acts in a determinate way even in the most open and unconstrained situations, whereas the agent with free will does not. A strict satisficer stops seeking income when he or she has reached an aspiration level – even if a 50 dollars bill suddenly appears on the sidewalk. The [agent in situational analysis] might pick up the bill."

is often black-boxed (as in Nelson & Winter, 1982). It is perhaps not surprising that a leading scholar who is strongly influenced by behaviorialism, 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.

Important strides forward is represented by the strategic management oriented work of Gavetti, Levinthal and Rivkin on the cognitive processes, including the use of analogy, of top managers in capability development and strategy making processes (e.g.,; Gavetti, 2005; Gavetti, Levinthal & Rivkin, 2005). This work represents a kind of hybrid between the capabilities first and the individuals first research traditions (particularly Gavetti, 2005). Additional leverage concerning theory development may from psychological research in motivational psychology and the psychological basis of creativity. Motivational psychology, particularly self-determination theory (Deci & Ryan, 1985), has proved extremely useful in both theoretical and empirical work dealing with knowledge-related behaviors (Cabrera, Collins & Salgado, 2006). A key and apparently fairly robust conclusion from this line of research is that there is a close association between creative, knowledge related behaviors and "autonomous" motivation. However, most of this research is uni-level, and accordingly does not systematically consider how, for example, autonomous behavior may be called forth, guided in certain directions rather than other, etc. by the deployment of certain kinds of HR policies, the exercise of certain management styles, etc., issues that clearly call for multi-level research (for important conceptual beginnings, see Osterloh & Frey, 2000; Lindenberg, 2003; Turner & Markhija, 2006; Gottschalg & Zollo, 2007). In sum, better foundations for the knowledge movement imply a certain "OB'ification" in terms of relying more on psychology-based work in investigating micro issues having to do with motivations for knowledge related behaviors as well as looking at those behaviors themselves (Epple, Argote & Murphy, 1996). However, those foundations must inherently involve a linking of behaviors to higher levels (e.g., groups, the level of deployment of HR practices, etc.) in terms of antecedents as well as outcomes of those behaviors (for more detail, see Foss, 2007). Otherwise one simply substitutes one uni-level approach for another one and is not necessarily better off. Thus, while ultimately there are strong philosophical reasons for beginning analysis at the micro-level (Felin & Foss, 2007; Felin & Hesterly, 2007), a micro 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; Gottschalg & Zollo, 2007; Abell, Felin & Foss, 2008).

Micro and Macro

Although this paper has come strongly out in favor of much more infusion of micro perspectives within the knowledge movement, the implication is not that explanation that makes use of macro variables be discarded. Much useful insight in organizations has been accumulated under the capabilities heading. For example, the capabilities first approach contains important insight into organizational sluggishness, specialization, the limits to diversification, and so on that it would be plainly foolish to discard. And some of its central tenets, for example, regarding the embeddedness of cognition and the localized nature of productive knowledge, are stylized facts that it is hard to take issue with (other than pointing to the need to equip them with micro-foundations). Similarly, while the network first approach can be criticized for over-emphasizing structure and neglecting certain key parts of the micro-foundations of the emergence and consequences of structure, it does contain important insights into the micro-aspects of knowledge processes. Finally, it is worth reiterating that a micro perspective does not mean that collective notions are "wrong." As mentioned earlier, it is legitimate to allow for variables that capture macro-levels in explanation, although ultimately, as noted by Gupta, Tesluk and Taylor (2007: 889), it is "incumbent upon researchers to clearly articulate *how* concepts at higher levels of analysis emerge from lower level entities and interaction." Thus, a multi-level mereology involves not only the macro to micro link, but also, crucially, the micro to macro link (Coleman, 1990).

Various kinds of mechanisms constitute these links. For example, Klein and Kozlowski (2000) point out that micro to macro processes may involve emergent phenomena to a different extent. While an organization-level construct such as innovation climate is composed of employees' perceptions of the potential of their work environment to foster innovation, there is a high degree of conceptual isomorphism of individual notions of innovation climate and the organizational level conceptualization of it. Linking micro and macro in this case simply means investigating the extent to which employees agree in their assessment of the organization's innovation climate (Gupta, Tesluk & Taylor, 2007: 888-9). However, aggregating from individuals to organization in the context of networks is a more complex affair, as it must inherently involve how individuals are structured in terms of density and centrality. Thus, organization (network) level variables enter the explanation jointly with individual level variables. Similarly, organization variables may impact individual level

variables directly, as in Coleman's (1990) account where institutional variables impact the conditions of individual actions. Or, they may moderate the relation between those conditions and the actions actually chosen (Abell, Felin & Foss, 2008). For example, Quigley et al. (2007) found that the trust between employees moderated the relation between their feelings of self-efficacy and their knowledge-related performance goals.

The complexities here are too many to fully account for, given space constraints. However, it is seems clear that the need for a multi-level approach in the knowledge movement is a pressing one. Most phenomena that relate to knowledge processes in (and between) organizations require, in principle, such an approach. However, we have so far made few strides forward in this endeavor which partly accounts for the fragmentation of research efforts within the knowledge movement (cf. the various "… first" approaches). The reasons for this situation are partly discipline- and field-dependent but are also related to the inherent complexities of building multi-level theory and the well-known practical difficulties of sampling data at multiple levels (Rousseau, 1985). In addition, knowledge of multi-level research methods is not that widespread in the relevant communities.

However, ultimately building mereologies is a necessity for sound multi-level research within the knowledge movement. Knowledge-related collective level constructs (e.g., capabilities) need to be placed on a secure foundation in individual actions and interactions; the nature of contextual influences from organizational variables in terms of impact on individuals' knowledge-related behaviors need further theorizing. The case may be made that the former task is a more pressing one than the latter one: Management research has done comparatively more on highlighting contextual influences than on understanding the context in terms of individuals (Felin, 2008), and sometimes arguments that organizations are "strong situations" (i.e., effectively mould individuals) (Pfeffer, 1997) seems to read as arguments for being complacent about what specifically is assumed about individuals. However, there are strong limits to this kind of social construction argument (Felin & Foss, 2009b), perhaps particularly in a knowledge-related context as strong situations arguments have difficulties accounting for the individual heterogeneity and interaction among heterogeneous individuals that seem central to processes of knowledge creation. Accordingly, this paper suggests that while multi-level theory is highly desirable, and must involve macro to micro links as well as micro to macro links, where we may be best off for the immediate future in terms of research efforts is in focusing on micro to macro links.

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TABLE 1: ***Research Strategies in the Knowledge Movement***

	Strategy I: Capabilities First	Strategy II: Networks First	Strategy III: Individuals First
Intellectual pedigree	**Evolutionary economics, behavioural org theory, innovation studies.**	**Granovetter (1973, 1985), Burt (1992)**	**Methodological individualism in economics, organizational behaviour research, human resource management, organizational economics.**
Key contributions	**Nelson & Winter (1982), Cohen & Levinthal (1990), Kogut & Zander (1992), Eisenhart & Martin (2000)**	**Ghoshal & Tsai (1998), Hansen (1999, 2002), Hanse**	**Simon (1991), Zenger Grant (1996), Felin & Hesterly (2007), Lindenberg (2003), Osterloh & Frey (2000), Grandori (2001), Gottschalg & Zollo (2007).**
Explanandum phenomena	**(Sustained) competitive advantage. Innovation performance. The boundaries of the firm.**	**Organization level knowledge sharing and innovation.**	**Same as in SI and SII + individual level phenomena.**
Conceptualizations of individuals	**Very little attention paid to characterizing individuals. Individuals are routine-bound. Non-routine behaviour is "*ad hoc* problem-solving."**	**Individuals tend to become identical with network positions/centrality. E.g., motivation fully endogenous to network position.**	**Individuals are heterogeneous; they are involved in intelligent adaptive effort.**
Unit of analysis	**Routines and capabilities**	**Structural and relational properties.**	**Knowledge transactions, "problems" (Nickerson & Zenger, 2004)**
Conceptualization of organization	**Bundle of routines and capabilities.**	**Main emphasis on "informal" aspects, i.e., knowledge networks.**	**Organizations serve individual ends.**
Mereology	**Mono level. Links between levels at best established by metaphor ("routines are the skills of an organization").**	**Both macro-micro and micro-macro links are investigated, but little attention to the characteristics of individuals**	**Investigate how macro-level variables impact individual-level variables; look at how individual decisions aggregate to organizational outcomes.**

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