

Diversity, conflict, and innovation: negotiating difference through project work

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Introduction

There is a tension at the heart of multi-functional project organisations between similarity and difference that arguably has a major impact upon the nature of knowing and learning in such settings. It has long been recognised that differences between organisational members can be both a source of creativity and innovation as well as triggering conflict and misunderstanding. Referring more broadly to the activities of highly differentiated groups in organisations, Driver (2003: 150) has described this tension in the following terms: “On the one hand, it has long been claimed that having more diversity or heterogeneous group membership leads to more innovative and higher quality solutions ... On the other hand, it has been found that diversity in groups can reduce performance by negatively affecting cohesion ... and member commitment to the group.” This is the equivalent of the well-established trade-off between differentiation and integration suggested by Lawrence and Lorsch (1967a, 1967b). More recently, the notion of ‘creative abrasion’ has been used to suggest that, appropriately managed, team diversity can promote creativity through the rubbing together of alternative perspectives (Leonard, 1995; Leonard and Swap, 1999). This questions much of the conventional wisdom on team working which has focused on the need for consensus and shared vision. As Brown and Duguid (2001) have argued, too much emphasis on reaching consensus can lead to premature foreclosure on creative search activities -the triumph of structure over process or exploitation over exploration (c.f. Levinthal and March, 1993; March, 1991).

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However, while these are taken for granted as familiar organisational dilemmas, there is considerably less agreement about what the precise relationships are between difference, cohesion, knowing, and learning. The literature relevant to this issue is effectively divided into three strands: those who argue for the benefits of cohesion (e.g. Bettenhausen, 1991; Druskat and Pescosolido, 2002; Mohammed and Ringseis, 2001); those who support the advantages of diversity (e.g. Guzzo, 1986; Hoffman and Maier, 1961; Janis, 1972, 1982; Levine *et al.*, 1993); and those who seek some sort of middle ground (e.g. Austin, 1997; Jehn *et al.*, 2000; Pelled, 1996). The first strand includes proponents of shared mental models who have argued that where these converge they “help team members determine appropriate actions, form expectations of each other, explain how the team operates, describe the current state of the team, and predict its future state” (Druskat and Pescosolido, 2002: 309). The implication is that cognitive convergence increases intersubjective understanding and reduces conflict, thus allowing for more effective interactions. In contrast, the second strand suggests that cognitive diversity in groups leads to enhanced decision-making outcomes by considering a wider range of possible alternatives, thus allowing for the emergence of new insights. The third strand includes those who have offered a more contingent understanding of the effects of group diversity, arguing that it is dependent on intervening conditions such as task type and degree of interdependence.

In attempting to resolve the debate the emphasis thus far in the literature has been on promoting the need for more empirical studies in an effort to determine some optimum level of diversity for enhancing group knowledge practices. This paper suggests that while such studies have provided some useful points of clarification, they are hamstrung by serious conceptual and methodological limitations that make it difficult to move the debate forward under the current terms of reference. In particular, despite their differences, many of the above accounts share a similar tendency towards static, functionalist explanations, in some cases allied with a narrow and ultimately individualised information-processing view of cognition, that is unequal to the task of providing a rich and dynamic understanding of the shifting interplay between diversity, conflict, and innovation in project settings. The sources of diversity (e.g. cognitive or informational, demographic, social-category-related, or value-based), for example, are often treated as fixed categories that form passive and unchanging inputs to the processes of group interaction. Little consideration is given to the socially constituted character of similarities and differences between team members; how they are produced, reproduced, augmented, or undermined through ongoing social interactions; nor

how they are socially, historically, and geographically situated. By implication, many of these studies suggest that, providing the correct variables and relationships are identified, it is possible to identify some sort of universal formula for selecting suitably diverse teams for carrying out specific tasks. This is an attractive possibility for organisational practitioners, as attested to by the widespread popularity of the Myers-Briggs Type Indicator as a selection tool in many companies (Overholt, 2004). However, such essentialist thinking is poorly placed for understanding the unfolding practices of project teams in action.

In an attempt to get beyond current approaches to the differentiation-integration dilemma, this paper argues for a reconceptualisation informed by practice-based approaches to organisational knowledge (e.g. Cook and Yanow, 1993; Gherardi, 2000; Lave and Wenger, 1991; Orlikowski, 2002). The emphasis here shifts from the static to the dynamic, from the individual to the social, and from the universal to the situated. This suggests the need for a recasting of similarities and differences as unfolding social accomplishments that are intimately bound-up with the knowledgeable practices of those participating in specific social settings. To attempt to understand the implications of team diversity without providing an account of their origin and evolution relative to specific socio-cultural conditions is at best incomplete. To this end, practice-based approaches are able to draw upon a rich and varied tradition of social theory that offers insights into how practices are reproduced over time, but also transformed, through the unfolding activities of knowledgeable actors under local conditions of action and interaction (e.g. Berger and Luckmann, 1966; Bourdieu, 1977, 1992; Garfinkel, 1967; Giddens, 1979, 1984; Schutz and Luckmann, 1973; Weick, 1979, 1995). However, the paper concludes by arguing that practice-based approaches, by being overly reticent to make reference to the cognitive dimensions of practice for fear of reverting to individualistic, mentalist explanations, ignore a crucial element of both the reproductive and transformative capacity of social practices. The variably shared and distributed interpretive schemas that people dynamically bring to bear in making sense of the situations they find themselves in are central in understanding practices as performances that are neither free-floating nor wholly constrained by pre-existing patterns and routines.

The structure of the paper is as follows. The next section sets the scene by considering some of the earlier attempts within contingency theory to think about organisational similarities and differences in terms of the dilemma between differentiation and integration. The following section considers the more detailed attempts within the literature on group and team cognition

to understand the precise implications of consensus and diversity on performance, concluding with an outline of some of the weaknesses and omissions of these approaches. The paper then turns to an account of the practice-based critique of conventional cognitive approaches, arguing that this can be taken too far, and proposes the benefits of a selective integration between cognitive and practice-based approaches. By way of conclusion, the paper considers some of the implications of this for thinking about project team diversity.

Revisiting the differentiation/integration dilemma

The implications, both positive and negative, of organisational differentiation have been a long-standing topic in the study of organisations. Much classical organisation theory, for example, focused on the technical and economic advantages of differentiation (e.g. Fayol, 1949 [1930]; Gulick, 1937; Urwick, 1937). Increased specialisation and functionalisation, it was argued, were a consequence of the growing scale and scope of organisational activity. However, while there was some acknowledgement that the benefits of organisational differentiation were tempered by the heightened demands for co-ordination that arose as a result (e.g. Gulick, 1937; Marshall, 1920 [1890]), this dilemma was not explored in more detail until the later work of contingency theorists (e.g. Burns and Stalker, 1961; Lawrence and Lorsch, 1967a, 1967b; Thompson, 1967; Woodward, 1965). Indeed, classical theory was unlikely to investigate in any comprehensive way the issue of integration because, as March and Simon (1993 [1958], p. 44) argued, it relied on a formal model of organisation from which, “if taken literally, problems of coordination are eliminated”. In contrast, contingency theorists, with their recognition of the multiplicity of organisational forms, were in a better position to consider the dilemmas of co-ordination as an open problem.

It was particularly with the writing of Lawrence and Lorsch (1967a, 1967b) that the tension between differentiation and integration took shape as a central theme in organisation theory. These writers also helped to highlight the social and psychological dimensions of integration in addition to its technical and economic aspects. As Davis and Newstrom (1985, p. 285, emphasis in original) suggested, “[t]he benefits of specialization are largely economic and technical, but its disadvantages are primarily human”. Thus, for example, Lawrence and Lorsch (1967a, p. 11) observed that there is a tendency for differences in “cognitive and emotional orientation among managers in different functional departments” to develop. These differences in orientation can lead to communication difficulties and conflict between

functional groups, making integration more problematic. As Lawrence and Lorsch (1967b, p. 42) argued: “In complex organizations having differentiated subsystems with different goals, norms, and orientations, it appeared that inter-group conflict would be an inevitable part of organizational life”. Having said that, there was also some recognition that not all conflict is necessarily dysfunctional and fragmenting. Using the typology of conflict resolution modes proposed by Blake and Mouton (1964), they predicted, perhaps counter-intuitively, “that the use of confrontation as the typical mode of conflict resolution would be an effective integrative procedure. The more confrontation and problem-solving that occurred within an organization, the more effective would be its integrative procedures” (Lawrence and Lorsch, 1967b, p. 42). We can see here the beginning of a link between conflict and problem-solving, with the former providing an impetus to the latter when it takes the form of a direct confrontation of interests and perspectives. This contrasts with either the resolution of conflict by force or the smoothing over of differences; behaviours that were found to be less integrative than confrontation.

However, despite beginning to consider some of the links between group relations, conflict, and problem-solving, Lawrence and Lorsch (1967a, 1967b) never fully elaborated this line of argument. Consistent with contingency theory’s preoccupation with the fit between organisational structure and different environmental conditions, they mainly identified structural responses to the difficulties of integration and inter-departmental communication without really exploring the psychosocial dynamics of intra-organisational relations in any great detail. As a result, although they included multi-functional projects and taskforces among their list of integrating devices, it almost appears that the mere existence of such mechanisms would itself solve the problem regardless of how they are actually patterned and evolve through social action and interaction. There was little acknowledgement that organisational forms, such as multi-functional projects, do not of themselves eliminate the tension between differentiation and integration, but rather provide a setting within which differences are negotiated, successfully or otherwise, in an ongoing fashion (Marshall, 2003).

Rather than resolving the problems of differentiation, multi-functional projects in fact generate a number of serious challenges for knowing, communicating, and learning across the boundaries of different functional, role-based, disciplinary, and other bases of identification (e.g. Ayas, 1996; Bresnen *et al.*, 2003; DeFillippi, 2001; Gann and Salter, 2000; Grabher, 2002; Hobday, 2000; Keegan and Turner, 2001; Prencipe and Tell, 2001). Issues created by

the high levels of differentiation of complex projects are exacerbated where the project takes the form of a short-lived temporary engagement. These settings are often characterised by high degrees of uncertainty, not least about others with whom team members are working for the limited duration of the project. This means that it is not always possible to rely on shared understandings and interpretations in co-ordinating the interdependent activities of the team. As Meyerson *et al.* (1996, p. 167) have argued, temporary groups, such as time constrained projects, “depend on an elaborate body of collective knowledge and diverse skills, yet individuals have little time to sort out who knows precisely what. They often entail high-risk and high-stake outcomes, yet they seem to lack the normative structures and institutional safeguards that minimize the likelihood of things going wrong”. Projects, therefore, often involve deeply uncertain and open-ended processes of negotiation across diverse individuals and groups who may exhibit quite distinct ways of interpreting project-related activities without always having a good idea of what these differences might be. According to Tenkasi and Boland (1986, p. 87), the need for continual negotiation in such situations suggests the importance of mutual perspective taking, commenting that “developing a comprehensive knowledge base among a community of highly differentiated yet reciprocally dependent individual specialists requires an ongoing process of mutual perspective taking where individual knowledge and theories of meaning are surfaced, reflected on, exchanged, evaluated and integrated with others in the organization”.

However, it is not enough to say that projects are the setting for intense episodes of negotiation without exploring the specific antecedents, influences on, and consequences of the interplay of different forms of knowledge, perspectives, interpretations, and interests. This is not something that was comprehensively investigated by contingency theory. Consequently, while the notion of differentiation and integration provides a useful starting point for thinking about the implications of knowledge diversity in project settings, it is to other strands of the literature that one needs to turn for a more detailed understanding. In particular, one segment of the literature that has considered the relationships between the diversity and performance of teams quite extensively can be found in the area of managerial and organisational cognition, and especially studies of team and group cognition. The next section outlines some of the main contributions of approaches within this tradition and the key differences between them before proceeding to a more critical commentary on their limitations.

Diversity, knowledge, and action in approaches to team cognition

There is an extensive literature on cognition within groups and teams that has attempted to address the nature of the interconnections between diversity, cohesion, knowledge, and action. Although, as we shall see, the literature on group and team cognition differs in important respects as to how these links are characterised, most accounts in this area share broadly the same understanding of cognition as involving pre-existing mental frameworks and representations that guide the processes through which we select, encode, categorise, store, retrieve, and utilise information. There is, thus, a clear influence from work on social cognition which itself has been strongly inspired by the information processing view in cognitive psychology (e.g. Anderson, 1983; Broadbent, 1958; Fiske and Taylor, 1984; McClelland *et al.*, 1987; Neisser, 1967; Newell and Simon, 1972). The emphasis is on people as ‘cognitive misers’ whose ability to interpret information is strictly limited and who are therefore reliant on heuristics, categorisations, stereotypes, and other simplification mechanisms to cope with attentional overload (Fiske and Taylor, 1984). In other words, what we attend to is, in large part, dependent upon pre-existing frameworks of thinking that have been built up through experience and which guide our perception, bracketing, and interpretation of the ceaseless flow of situations we encounter. A range of terminology has been used to refer to these frameworks of thinking, including frames (Minsky, 1975; Mitchell, 1986), scripts (Abelson, 1981; Schank and Abelson, 1977), schemata (Moussavi and Evans, 1993; Rummelhart, 1984), categories (Rosch, 1978), personal constructs (Kelly, 1955), cognitive maps (Tolman, 1948), and mental models (Gentner and Stevens, 1983; Johnson-Laird, 1983). In several cases, these concepts were developed to refer to cognition at the individual level and, as I shall argue later, this individual focus has often been carried through into the study of social cognition. However, not all approaches to team or group cognition accept that social-level cognition involves a straightforward aggregation or scaling up of individual cognition. Indeed, there is considerable disagreement about the precise relationship between individual and social cognition, bearing a number of interesting similarities to the debate about the link between individual and organisational learning (e.g. Dodgson, 1993; Easterby-Smith, 1997; Fiol and Lyles, 1985; Kim, 1993; March and Olson, 1975). It is arguably because of differences in how to tackle this issue that the following accounts diverge in their understanding of the interplay between cognitive diversity, consensus, and team performance. The literature can be broadly divided into three groups: those who favour consensus or shared cognition across the team; those who suggest the value

of team diversity; and those who adopt a more contingent stance where the implications of diversity and consensus are measured against the varying demands of different tasks and situations.

Consensus approaches to team cognition

The first group of approaches emphasises the importance of consensus for effective team performance. Strong advocates of this argument can be found in the work of writers on so-called shared or team mental models. These have often taken as their starting point the definition of mental models developed with reference to individual cognition by Rouse and Morris (1986, p. 351) as follows: “Mental models are the mechanisms whereby humans are able to generate descriptions of system purpose and form, explanations of system functioning and observed system states, and predictions of future system states”. Thus, for example, Cannon-Bowers *et al.* (1993, p. 228) offered a similarly functional definition of shared mental models based on what they are purported to contribute to team co-ordination, characterising them as “knowledge structures held by members of a team that enable them to form accurate explanations and expectations for the task, and in turn, to coordinate their actions and adapt their behavior to demands of the task and other team members”. Focusing more on the types rather than functions of knowledge associated with team mental models, Cooke *et al.* (2000, p. 153) have defined them as “collective task- and team-relevant knowledge that team members bring to a situation ... [which] can be declarative (i.e. the facts, figures, rules, relations, and concepts in a task domain), procedural (i.e., the steps, procedures, sequences, and actions required for task performance), or strategic (the overriding task strategies and knowledge of when they apply ...)”.

There is broad agreement among researchers in this area that, rather than being a single mental model relevant to team activities, there are likely to be multiple models pertinent to different domains. Following Cannon-Bowers *et al.* (1993), distinctions are typically made between: 1) task models, relating to task requirements, procedures, strategies, constraints, and environmental conditions; 2) equipment models, including knowledge of equipment or technology and how it is used; 3) team interaction models, covering the roles and responsibilities of team members, interdependencies, information and communication flows, and interaction patterns; and 4) team attributes, including awareness of the knowledge, skills, attitudes, preferences, and expected behaviour of other team members. A number of

commentators have also distinguished between team mental models, such as those referred to above, and team situation models. The latter have typically been characterised as more fleeting, dynamic, and context-specific than the former, referring to the degree to which team members share a similar perception of the unfolding activities of the team as they engage in particular activities (e.g. Cooke *et al.*, 2000; Endsley, 1995).

A good deal of the literature on team mental models has been concerned with exploring the link between shared team cognition and team performance. The central argument of this group of approaches is that the more overlap there is between individuals' mental models within a team, the more team members share expectations and are able to predict the actions of others in the team. This is said to result in better co-ordination and communication within the team, which in turn lead to enhanced team performance (Cannon-Bowers *et al.*, 1990, 1993; Duncan *et al.*, 1996; Rasker *et al.*, 2000; Rouse *et al.*, 1992). Studies attempting to show the implications of shared mental models for performance have largely been based on data derived from experimental and simulation settings. For example, Mathieu *et al.* (2000) conducted a study with fifty-six pairs of undergraduates undertaking a series of computer-based flight combat simulations. Their findings supported the claim that greater convergence of team mental models relates to enhanced team processes and therefore to improved team performance. In another experimental study involving thirty-seven student groups in a simulated decision-making exercise, Mohammed and Ringseis (2001) found that cognitive consensus was a significant variable not only in the quality of decision processes but in perceived satisfaction with the decisions reached and in the anticipation of fewer problems with implementing them.

Druskat and Pescosolido (2002) also supported the convergence argument, accepting that the greater the agreement between team member mental models the better the team is likely to perform. However, they additionally argued that the content of shared models is equally important, with some models being more appropriate for guiding team behaviour than others. Focusing on teamwork mental models (in contrast to models of task or equipment), they proposed three areas of content that are likely to influence team effectiveness: a need for psychological ownership of team processes and outcomes; a need for continuous learning; and a need for heedful interrelating. In a similar vein, Smith-Jentsch *et al.* (2001) have argued that it is not only important for team members to share similar teamwork mental models, but also for those models to be accurate. This is because where "team members

share similar but inaccurate mental models about teamwork, they may select and strive towards goals that do not necessarily improve their performance” (Smith-Jentsch *et al.*, 2001, p. 180).

While most attempts to present empirical evidence on the effects of team mental models have relied on data collected in rather contrived experimental settings, there have been some attempts to study the implications of mental model agreement under more naturalistic conditions. For example, Rentsch and Klimoski (2001) conducted a questionnaire based study of work teams from a United States Department of Defense organization into the antecedents and outcomes of teamwork schema agreement. Their findings suggested that team demography, experience, recruitment, and size were significantly related to team member schema agreement, which in turn was significantly related to team effectiveness. Based on the results, they speculated that “[p]erhaps team member homogeneity increases team member schema agreement thereby producing smooth intrateam relationships resulting in high team effectiveness” (Rentsch and Klimoski, 2001, p. 117).

Diversity approaches to team cognition

Offering a complete contrast, the second set of approaches highlights a number of key problems arising from too much consensus. The phenomenon of ‘groupthink’, for example, refers to situations where group cohesion and pressures for conformity and concurrence are so high that the quality of decision-making suffers (Janis, 1972, 1982). As Janis (1982, p. 245) argued, “[t]he more amiability and esprit de corps among the members of an ingroup of policy-makers, the greater is the danger that independent critical thinking will be replaced by groupthink, which is likely to result in irrational and dehumanizing actions directed at outgroups” (Janis, 1982, p. 245). In other words, it is beneficial for groups to retain diversity because without it individual contributions, with their potential to challenge and disrupt settled beliefs, will be lost. Based on a laboratory study of groups, Hoffman and Maier (1961) also indicated that group diversity has a positive effect on decision quality. With diverse groups it is more likely that there will be a variety of perspectives on a problem, the group will tend to be more creative, and the solutions reached are generally of higher quality. More recently, Lewis and Huber (2005) have argued that where group members’ mental models are dissimilar this tends to promote increased surfacing and clarification of task-relevant information and encourage learning about the task. Levesque *et al.* (2001, p. 141)

contend that cognitive dissimilarity within teams, particularly where they are temporary in nature, can be functional because “developing a common mental model may lead to greater process losses than efficiency gains and thus lead to ineffective teams”. In other words, the time, energy, and resources put into creating and maintaining shared mental models between team members, primarily through ongoing and intensive communication and information exchange, may actually detract from overall task performance. In their review of a range of empirical studies, Jackson *et al.* (1995) concluded that team heterogeneity is positively related to creativity and decision-making quality.

Contingent approaches to team cognition

The third and final set of approaches considered in this section attempt to steer some sort of middle course between the advantages and disadvantages of both consensus and diversity. In some accounts this takes the form of an acknowledgement that diversity may be more suited to some tasks and situations, while in other cases there are benefits to greater homogeneity. For example, Stout *et al.* (1999) have suggested that increased sharedness across mental models within a team is most advantageous where the workload is high and tasks need to be completed under extreme pressure of time. In these instances there is little time for team members to express and evaluate alternative perspectives and so the benefits of being able to anticipate the actions and responses of other individual members due to sharing compatible mental models of the task, team, equipment, and situation are greater. Bernthal and Insko (1993) have provided conceptual clarification to the groupthink argument by suggesting that not all forms of cohesion lead to declining decision quality. They make a distinction between social-emotional and task-oriented cohesion and contend that the latter can counteract the former by encouraging a more analytical orientation in which there is more rigorous search and evaluation of information, greater task focus, and more motivation to work to the task.

Jehn *et al.* (1999) have broken down the notion of team diversity into different components, namely: social category diversity, i.e. differences in members’ social categorisation along such dimensions as race, gender, and ethnicity; value diversity, i.e. differences between members according to their values and priorities; and informational diversity, i.e. differences in knowledge and perspective between team members. They also discriminated between varying forms of conflict, including conflict around the content of the task being performed (i.e. what to do), conflict about the process by which the task is undertaken (i.e. how to do it),

and relationship conflict concerning disagreements about personal preferences and interpersonal interactions, often over non-work issues. The study, based on a survey of 485 employees in a firm in the household goods moving industry, indicated that different types of diversity, given alternative task configurations in terms of type and interdependence, tend to promote different forms of conflict in quite complex ways. However, an overarching conclusion was that value diversity has the greatest potential for causing problems of group conflict and may actually moderate other forms of diversity. Consequently, as the authors suggest, “[f]or group members to be willing to engage in the difficult and conflictual processes that may lead to innovative performance, it seems that group members must have similar values” (Jehn *et al.*, 1999, p. 759).

Gibson (2001) has argued that conflict and consensus have different implications depending on the type of collective knowledge processes involved. This is based on a fourfold classification of knowledge processes as follows: 1) accumulation, which involves perceiving, filtering, and storing information; 2) interaction, comprising the retrieval, exchange, and structuring of information; 3) examination, which includes the negotiation, interpretation, and evaluation of alternative perspectives, judgements, and beliefs; and 4) accommodation, in which, to a greater or lesser extent, different perspectives are integrated and decisions and actions are generated. The paper suggests that where there is more conflict within a group there will be more time spent on examination and interaction activities, while groups with greater consensus will be more effective at accommodation activities. One implication of this is that although conflict may be productive because it stimulates creativity and debate, it may be difficult for such groups to implement the fruits of their creativity in terms of decisions and actions.

Drawing on cognitive processing theory (e.g. Abelson, 1976; Bargh, 1982), Austin (1997) has explored the interrelations between group diversity, mode of cognitive processing, and type of task. Making a distinction between automatic and active modes of cognitive processing, he argued that the former is more suited to routinised tasks in which the speed and accuracy of completion is important, whereas the latter is more appropriate for creative thinking and ill-defined problem-solving tasks where contextual cues are relevant (c.f. Louis and Sutton, 1991). Group diversity is hypothesised to have an influence on when people within groups switch between automatic and active modes of processing. Switching to active processing is most likely to occur with moderate levels of novelty. When individuals are

confronted with a new situation that does not fit into any of their existing schemas, their attention to the situation is heightened in an attempt either to modify the existing schema or generate a new one. However, if there is too much novelty, where there is too much of a discrepancy between existing schemata and the conditions presented by the new situation, then it has been suggested that individuals cling to an automatic mode of processing as a way of coping with the threat and uncertainty of the situation (Kiesler and Sproull, 1982; Staw *et al.*, 1981). To the extent that group diversity increases the occurrence of novel events within the group situation, active processing will be promoted, and group creativity will be stimulated. However, it is argued that there is a threshold level of diversity beyond which conflict will increase, cohesion and communication will decline, and individual members will switch back to automatic processing, thereby reducing creativity and innovative problem-solving. The idea that the impact of heterogeneity on team effectiveness follows a curvilinear relationship has been supported by a number of authors (e.g. Earley and Mosakowski, 2000).

Other writers have argued that consensus and differentiation can be simultaneously present along different dimensions of a distributed group knowledge system (c.f. Hutchins, 1995a; Tsoukas, 1996; Weick and Roberts, 1993). The notion of transactive memory, for example, suggests that knowledge is differentially distributed across group members, yet such systems tend to operate most effectively where there is interpersonal awareness of who knows what within the group (Wegner, 1986, 1995). In other words, while there is differentiation of the precise content of knowledge across the group, with all the attendant advantages of specialisation for developing individual expertise, there is consensus around how this knowledge is distributed that allows the expertise of the group to be drawn on collectively (Austin, 2003; Hollingshead, 1998, 2000). One benefit of such distributed knowledge systems is that they reduce duplication of effort. As Banks and Millward (2000, p. 514) have observed, “[a] fully shared mental model entirely duplicates labour so that each team member does all the work rather than dividing it between the team”.

Limitations and omissions

While the literature on cognitive diversity within teams outlined in this section has provided a number of interesting insights into the interplay between conflict, consensus, and team performance, it still appears that disagreements between the three main approaches on the issue are far from being resolved. For several authors the potential for resolving the debate is

primarily linked to being able to develop suitably refined empirical instruments and providing a more comprehensive evidence base (e.g. Langan-Fox *et al.*, 2001; Mohammed and Dumville, 2001). There is the belief that the conceptual development of the team mental model approach and related ideas have run ahead of the available evidence. However, while in no way denying the importance of a reciprocal interplay between theory and evidence, it is unlikely that the presentation of further empirical data will have any major impact so long as it remains tied to the current terms of the debate. In several cases this is because the conceptual framework that would drive the search for further evidence is effectively wedded to an individualised, information processing view carried over into the study of social cognition from cognitive psychology. This has been criticised, especially in its orthodox formulation, on a number of fronts.

Computers are the dominant metaphor for the information processing model, with cognition portrayed as involving processes of encoding, storage, and retrieval of information (Thompson and Fine, 1999). The result has been what has been described as an emphasis on ‘cold’ cognition, portraying such activities and processes as planning, problem-solving, memory, logical inference, and reasoning in dispassionate terms without really considering the issues of emotion and motivation (Schwarz, 1998; Westen, 1991). Schwarz (1998, p. 241) has also argued that “the computer metaphor as a guiding framework also fostered an exclusive concentration on individuals as isolated information processors. This focus resulted in a neglect of the social context in which humans do much of their thinking”. It may seem to be a contradiction in terms to speak of the literature on group and team cognition as having a strong individual focus when its subject matter is so obviously social. However, this is justified to the extent that approaches in this area exhibit one of two tendencies - either reifying teams or groups and treating them as cognising agents displaying the same characteristics and processes as individual cognition, or reducing collective cognition to the simple aggregation of individual cognitive processes. Cooke *et al.* (2000, p. 154) provide an example of the former position when they “assume that teams, like individuals, possess knowledge and that this knowledge is reflected in actions or behaviors”. The latter tendency can be found in several of the approaches outlined above, particularly in some of the team mental models literature and accounts of transactive memory. In either case, there is a definite mentalist orientation where the emphasis is very much on what is going on ‘in the heads’ of individuals involved in the team or group (c.f. Norman, 1993).

As we shall see in more detail in the following section, a range of approaches, gathered for convenience under the label of practice-based theories of knowing and learning, have launched a persuasive critique against the individual, mentalist, information processing view of cognition (although, see Vera and Simon, 1993, for an attempt to counter this). For example, Lave and Wenger (1991, pp. 15-16) have argued that “[l]earning is a process that takes place in a participation framework, not in an individual mind. This means, among other things, that it is mediated by the differences in perspective among the coparticipants ... Learning is, as it were, distributed among coparticipants, not a one-person act”. Similar arguments have been made by other proponents of the situated character of knowing and learning (e.g. Suchman, 1987; Greeno, 1989, 1998). Closely associated with these perspectives are arguments about distributed cognition that regard cognitive processes as being not only socially situated but also spread across both humans and material objects, involving the interplay of internal and external representations (Hutchins, 1995a, 1995b).

To be fair, some approaches to team cognition have begun to acknowledge the conceptual problems of taking the individual as the primary unit of analysis and building up from there. For example, Banks and Millward (2000) have attempted to clarify and extend the notion of shared mental models by conceptualising them not simply as an overlapping configuration or aggregate of individual mental models. Instead, a shared mental model is hypothesised to be “divided or distributed amongst the team and other artifacts” (*ibid.*, p. 514). Several others have noted the confusion surrounding such terms as ‘shared’ or ‘team’ cognition (Cannon-Bowers and Salas, 2001; Klimoski and Mohammed, 1994; Mohammed *et al.*, 2000). For example, what it means for a mental model to be shared could imply several different conditions. According to Klimoski and Mohammed (1994), a shared mental model could refer to a knowledge framework that is identical among team members, comprising common knowledge; or distributed across the team with no overlap but providing an overall coverage of knowledge necessary to undertake a given task; or to knowledge that overlaps between team members but is not fully identical. Another interpretation of shared refers to situations where team members hold dissimilar yet compatible or complementary knowledge, or what Donnellon *et al.* (1986) have termed equifinal meanings (see also, Cannon-Bowers and Salas, 2001; Cannon-Bowers *et al.*, 1993).

Nevertheless, despite attempts to clarify the relationship between individual and social levels of cognition in this literature, it is arguably the case that these conceptual refinements have

not been fully operationalised in the chosen methods for investigating team cognition. Indeed, if anything the presentation of empirical evidence has tended to perpetuate a pronounced individualistic, static, and functionalist orientation that is often incompatible with the theoretical clarifications that have been made. Thus, while a number of authors have been careful to avoid characterising mental models, schemata, or cognitive frames in a static, individualistic, and entitative way, their empirical attempts to explore the role of such phenomena has frequently created the impression that this is precisely how they are being conceived. This is especially the case with those studies that have attempted to investigate the nature of the relationship between team mental models and performance. In these types of study the method often involves experimental or simulated teams, tasks, and environments. While not denying the usefulness of such approaches for clarifying many key issues about team cognition, it is crucial to acknowledge the limitations of such studies. Arguably their greatest strength is also their biggest weakness. Experimental and simulation studies are able to provide settings in which variables can be controlled and manipulated to allow the researcher to focus on the role of those that are hypothesised to be of relevance. However, the ability to manipulate experimental settings often comes at the cost of simplification and abstraction. This means that they are typically limited in their ability to emulate what Greeno (1998) has termed ‘intact activity systems’.

For instance, the teams involved in such studies tend to be drawn from groups who are easily available to the researchers (typically university students) who do not necessarily have the range of backgrounds, experiences, and expertise of teams involved in actual work situations. Unlike actual work groups, these experimental subjects usually do not have prior experience of the specific task to be performed whereas the former are likely to exhibit a range of proficiencies from novice to old timer, with all the interesting dynamics that that introduces (c.f. Lave and Wenger, 1991). They are often given quite simple tasks to perform that are abstract and decontextualised in the sense that they are the sole focus of activity for the duration of the experimental sessions. People involved in actual work groups will tend to undertake, individually or with others, a range of more or less simple or complex tasks that are performed, with greater or lesser intensity, concurrently or sequentially, continuously, cyclically, or intermittently. Crucially, the specific, historically situated combinations, sequences, and intensities of these tasks are likely to influence their unfolding performance. This is extremely difficult to simulate in anything other than a contrived and artificial fashion under experimental conditions.

Moreover, the research subjects asked to undertake these simulations are unlikely to share the same motivations and interests as actual work groups. Consider, for example, the difference between a simulated negotiation task undertaken by student subjects in a laboratory setting and members of an inter-organisational project team negotiating about the cost, time, or scope of their joint undertaking. In the latter case, the stakes are clearly higher in terms of financial impact, project performance, career development, reputation, and so on. Finally, the time-scale of experimental studies is often rather short. In the most extreme cases these are one-off engagements where the participants are thrown together for the duration of the task, having been duly selected and grouped according to whatever cognitive or other profile they have been shown to exhibit. This may reflect the situation in some highly temporary work groups, but is hardly representative of a whole range of more enduring organisational interactions. What such short-term experiments are unable to investigate are the unfolding processes through which groups and teams evolve. These settings are effectively assumed to be outside of history, with no shared past for participants to draw on or future to orientate themselves to. Even where longer studies are conducted, these are often limited by the time constraints of student course modules, and in any case still typically lack the character and intensity of many real work situations.

However, regardless of all these limitations - many of which have been ameliorated through increasingly sophisticated experimental designs - there are more inescapable features of experimental approaches that make them less suited for investigating the dynamic, unfolding, situated, context-dependent, and complexly interconnected processes of knowing and learning in practice. The main problem is that such approaches tend towards reductionism in assuming that team cognition can best be understood by subdividing it into simpler components, factors, or variables that can then be reassembled to form a complex whole (c.f. Vera and Simon, 1993). The aim of experimental approaches is to manipulate conditions so as to isolate one or a few features of interest. As Greeno (1998, p. 7) has described it, “[e]xperimental conditions are arranged to provide information about one of the processes of perception, comprehension, memory, inference, or judgement, assuming that the influence of other processes can be neglected in drawing conclusions about the process that the experiment was designed to investigate”. The problem is that by isolating factors, treating them as discrete and independent variables to be manipulated under experimental conditions, almost invariably encourages them to be hypostatized. At worst this means that people are themselves treated as bundles of individual characteristics whose presence or absence, in

combination with those of other team members, together influence the overall activities and performance of the team. The focus becomes one of trying to discover the magic combination of characteristics needed to assemble a high performing team. Although it is not logically necessary for such studies, once teams, individuals, and situations are reduced to a series of component parts, the emphasis is typically a narrowly functional one, investigating the effects and outcomes of these characteristics rather than considering how such features are constituted nor how they change and evolve. The individual characteristics and traits of team members come across as static attributes rather than actively and historically constituted elements. Another tendency that seems to follow from such atomistic thinking is that of treating individuals and the settings within which they act and interact in strongly dualistic terms, with contexts forming a passive and container-like backdrop to team activities. Finally, there is an orientation in such studies towards seeking some universal laws of team functioning – the winning formula of characteristics that, combined in the right mixture and deployed under the correct conditions, will lead to high performance. Practice-based approaches to knowing and learning have been especially critical of such reductionist, static, and essentialist approaches, and it is to a consideration of these that we now turn.

Insights from practice-based theories of knowing and learning and beyond

In this section it is argued that practice-based approaches to organisational knowing and learning are able to address many of the weaknesses of the different theories of team cognition outlined above. In particular, the former offer an holistic understanding of knowing and learning as dynamic, emergent, social accomplishments that are actively situated within specific contexts of practice. Consequently, they are able to counter some of the tendencies observed in approaches to team cognition towards depicting knowledge and learning in static, dualistic, internalised, and ultimately individualised terms. According to Lave and Wenger (1991, pp. 50-51), “a theory of social practice emphasizes the relational interdependency of agent and world, activity, meaning, cognition, learning, and knowing. It emphasizes the inherently socially negotiated character of meaning and the interested, concerned character of the thought and action of persons-in-activity”. Similarly, Gherardi (2001, p. 134) has argued that “when the locus of knowledge and learning is situated in practice, the focus moves to a social theory of action that addresses activity and passivity, the cognitive and the emotional, mental and sensory perception as bits and pieces of the social construction of knowledge and of the social worlds in which practices assume meanings and

facticity”. Thus, a crucial feature of these approaches is a shift in focus from ‘cognition in the head’ to ‘cognition in practice’ (Lave, 1988).

The emphasis is on the socially constituted, indeterminate, revisable, and negotiated character of knowledge. This in contrast to representationalist approaches that believe in the possibility of a mirror-like correspondence between external, independent phenomena and the mental structures and language used to represent them (c.f. Rorty, 1979). As Winograd and Flores (1986, p.73), have described it, this view, at its simplest, “accepts the existence of an objective reality, made up of things bearing properties and entering into relations. A cognitive being ‘gathers information’ about those things and builds up a ‘mental model’ which will be in some respects correct (a faithful representation of reality) and in other respects incorrect. Knowledge is a storehouse of representations, which will be called upon for use in reasoning and which can be translated into language. Thinking is a process of manipulating representations”. As we saw in the previous section, a number of approaches to team cognition come perilously close to exhibiting a representationalist bias with all the limitations that this implies. Not least of these is the tendency to encourage dualistic thinking, relying upon a series of strict oppositions (between subject and object, mind and body, thought and action, and so on). Practice-based approaches are deeply critical of this, presenting instead a relational and process-orientated view of the mutually constitutive nature of social phenomena which makes it meaningless to speak of them independently. As Lave and Wenger (1991, p. 51) put it, “the socially and culturally structured world ... is socially constituted; objective forms and systems of activity, on the one hand, and agents’ subjective and intersubjective understandings of them, on the other, constitute both the world and its experienced forms”. It is from recognising the mutually constituted character of knowledge and practice that questions of context, situation, and setting come to the fore. This is because at “issue here is not knowledge as a self-standing body of propositions but identities and modes of action established through ongoing, specifically situated moments of lived work, located in and accountable to particular historical, discursive and material circumstances” (Suchman, 2000, pp. 312-313). Once again there are important differences here with the approaches to team cognition outlined above, several of which tend to treat the context or setting of team activities as a static backdrop that is more or less accurately or inaccurately represented in team members’ mental models of the team, task, equipment, or situation. Practice-based approaches conceptualise context not simply as a container within which

activities occur, but as crucially enacted whereby its elements are simultaneously influence on, medium, and outcome of social activity.

One of the key advantages of practice-based approaches is that they seek to provide an historically situated account of practices, acknowledging that they follow complex and sometimes contradictory trajectories. This is in opposition to some theories of team cognition that appear to portray team dynamics as driven by universal and immutable tendencies, and thus as effectively ahistorical. Practice-based approaches have drawn upon a range of ideas from wider social theory to attempt to conceptualise the historical development of social practices. These include Bourdieu's theory of practice (Bourdieu, 1977, 1992), Giddens' structuration theory (Giddens, 1979, 1984), and Weick's theory of enactive sensemaking (Weick, 1979, 1988, 1995). Each offers a relatively similar treatment of the reciprocal and recursive relationship between structure and agency while attempting to avoid the twin pitfalls of either structuralism or voluntarism. For Bourdieu (1977, 1992), ongoing collective practices are guided by 'durable transposable dispositions' associated with a given *habitus* that provide the generative rules and resources, applicable across a wider or narrower set of circumstances, permitting a practical sense (*sens pratique*) or feel for what is and what is not appropriate conduct given the situation at hand. These dispositions, which incline people to think, act, and react in particular ways, are gradually and progressively established through a process of inculcation for which early childhood experiences are especially important, but which are also subject to subsequent addition and modification. As we shall see shortly, however, just how far and under what conditions such changes are possible is an open question. Structuration theory is another influential attempt to transcend the dualism between structure and agency, in this case founded on the core notion of 'duality of structure' (Giddens, 1979, 1984). This is intended to capture the idea that neither social structures nor human agency are logically prior nor have existence independent of each other. Instead, they are mutually constituted, whereby "the structural properties of social systems are both medium and outcome of the practices they recursively organize" (Giddens, 1984, p. 25). Orlikowski (1992, 2000, 2002), for example, has drawn upon structuration theory in her efforts to develop a practice-based account of the use of technologies. She has argued that "[s]uch a practice lens recognizes that emergence and impermanence are inherent in social structures - that while habitual, routinized, and institutionalized patterns of using a technology may be evident, these are always ongoing accomplishments, and thus there can be no single, invariant, or final technology-in-practice, just multiple, recurrent, and situated

enactments” (Orlikowski, 2000, p. 412). In a similar vein, the theory of enactive sensemaking proposes that people play an active part in creating the environment for their own actions by bracketing and punctuating their stream of experience which, in turn, enables and constrains particular courses of action (Smircich and Stubbart, 1985; Weick, 1979, 1988, 1995). “The term ‘enactment’ is used to preserve the central point that when people act, they bring events and structures into existence and set them in motion. People who act in organizations often produce structures, constraints, and opportunities that were not there before they took action” (Weick, 1988, p. 306).

Two crucial questions, themselves closely interlinked, need to be answered. Firstly, if structures have no independent existence except in their moment-to-moment instantiation through situated practices, how is their recursive character sustained over time making them more or less durable? Secondly, presuming one can provide a satisfactory answer to the first question, what then are the processes and conditions through which change is possible? Each of the approaches summarised above provide a rather different response to these questions. Bourdieu, for example, tends to emphasise the reproductive rather than transformative nature of structures, thus focusing more on the first question than the second. In his theory of practice it is sometimes difficult to see just how changes are possible given the comprehensive grip that habitus appears to have on people’s thought and actions. Consider the following definition: “As an acquired system of generative schemes objectively adjusted to the particular conditions in which it is constituted, the habitus engenders all the thoughts, all the perceptions, and all the actions consistent with those conditions, and no others” (Bourdieu, 1977, p. 95). In contrast, Giddens’ portrayal of the instantiation of structures and Weick’s notion of enactive sensemaking seem to offer more answers for the second question than the first. In structuration theory the emphasis on the ‘virtuality’ of structure has attracted the criticism that, contrary to all his careful claims to the contrary, Giddens actually ends up prioritising agency by reducing structure to action, conflating the two concepts rather than preserving the analytical distinctions between them (Archer, 1982, 1988, 1990, 1995, 1996; Callinicos, 1985; Emirbayer and Mische, 1998; Layder, 1987). Similarly, albeit from the entirely different direction of deconstruction rather than critical realism, the concept of enactment has been attacked for its voluntarism and subjectivism (Fox, 1996).

What is at issue here is being able to account for the circumstances under which practices are reproduced as recurring patterns of action and those where, to a greater or lesser extent, they

are modified or transformed. Influenced in no small part by ethnomethodology, studies within the practice-based tradition have mostly focused on attempting to reconstruct the patterned character of practice by investigating how people make sense of everyday situations, from which various typifications or rules concerning the contextualisation or indexicality of practices can be inferred (c.f. Garfinkel, 1967). However, it is not always clear how the linkages between typifications and situated actions are forged in practice, nor how they are mutually constituted. For some it is enough to rely on the observability of practices and infer the patterns, scripts, and processes through which they are made intelligible from there. Coming from a structurationist perspective, Barley and Tolbert (1997, p. 98) have argued that “it is empirically more fruitful to view scripts as behavioural regularities instead of mental models or plans. From this perspective, scripts are *observable, recurrent activities and patterns of interaction characteristic of a particular setting*” (Barley and Tolbert, 1997, p. 98, emphasis in original). Practice-based approaches share this distrust of cognitive explanations. For example, Gherardi and Nicolini (2002, p. 195) have argued that there needs to be a shift of attention “from the processing of information and the modifying of cognitive structures to the processes of participation and interaction that provide and sustain the proper context for learning: learning in organization becomes learning-in-organizing”. However, my argument is that the anti-cognitive bias in practice-based approaches is both unnecessary and ultimately limiting. One does not have to abandon *any* reference to cognition in order to avoid the pitfalls of cognitive approaches that practice-based theory so eloquently highlights. Indeed, by being excessively reticent to speak of cognitive processes, practice-based approaches have closed down a fruitful avenue of investigation that may offer a more detailed understanding of how practices are constituted, reproduced, and transformed than they have so far been able to offer. Although there are those who doubt the potential of integrating sociological styles of interpretation, which practice-based theories typically employ, with cognitive approaches (e.g. Woolgar, 1995), there have nevertheless been those within the practice-based tradition that have been calling for precisely such a rapprochement (e.g. Greeno, 1998). There are a few practice-based theorists who have taken some steps in this direction, notably the work of Orlikowski and Gash (1994) on technological frames, but such attempts have generally been few and far between (as have other more general attempts to forge connections, such as the relatively unpopulated area of cognitive sociology, e.g. Cicourel, 1973, 1981; Zerubavel, 1999).

It is worth recognising that the practice-based critique of cognitive approaches is perhaps rather ingenuous, based as it is upon something of a caricature of these approaches. Certainly by using the rhetorical device of setting themselves up in opposition to ‘conventional’ or ‘traditional’ cognitive theories, practice-based approaches are able to make their arguments stronger and more distinctive. There is, however, a question mark over whether the rhetorical benefits of a thoroughgoing rejection of cognitive approaches does not come at the expense of ignoring any useful insights from this body of work at all. Practice-based approaches are reticent about making reference to patterns, frameworks, or models of thinking, collective or otherwise, for fear of veering towards representationalism and mentalism, yet one does not have to accept a representational or mentalist position to draw conceptual benefit from the notion that patterns of collective activity are, to some extent at least, enabled and guided by interlocking cognitive schemas that are, to a greater or lesser degree, generated, reproduced, and modified by people participating in joint activities. Indeed, there is much to be gained for practice-based approaches in taking on board ideas from social cognition because it is arguably in the study of the interplay between individual and socially overlapping knowledge frameworks that important steps can be taken towards understanding the different circumstances under which practices are reproduced or transformed.

Indeed, if one turns to social theories of practice from which practice-based approaches draw inspiration, it is clear that the former are not so reticent about invoking cognitive processes in attempting to theorise issues of continuity and change. Giddens (1979, 1984), for example, emphasises that actors are knowledgeable, in the sense that their knowledge of rules, conscious or otherwise, makes them capable of action (c.f. Sewell, 1992). The theory of structuration refers to memory traces and pre-existing interpretive schemes as carriers of the reproducibility of practice. It is not too much of a leap from invoking rule-related knowledge, memory traces, and interpretive schemes to talking about mental models, schemata, frames, and scripts. Whatever the terminology, it should be evident that some relatively durable framework for knowing is needed for practices to be reproduced over time and space. To claim the relevance of cognitive frameworks for reproducing social practices is in no way inconsistent with the crucial argument that such frameworks for knowing are embodied, inhere in, and are variably distributed across, specific social and material settings in which practices are actively situated. To talk about schemata, mental models, and so on, does not have to conjure up images of knowing as taking place solely ‘in-the-head’. However, this does not mean that one has to deny any role for knowing-in-the-head for fear

of mentalism. This is providing, of course, that one does not make the mistake of depicting cognition entirely as an individual, internalised, rational, impassive, and dispassionate activity. It is by no means inevitable that one must subscribe to such a view simply because one invokes cognitive processes as a relevant dimension of organisational knowing and learning. That this has come to appear inevitable is in no small measure due to the seemingly unbreakable association that has been made between cognition and the information processing view. However, this association is not as unbreakable as it might seem and once that is acknowledged many of the apparent incompatibilities between cognitive and practice-based approaches largely disappear.

Considering the role of cognitive schemata, for example, it is not necessary to see these in purely computational terms as providing the algorithms and transformation rules that mediate between the input and output elements of information processes. They can be, and indeed have been, conceptualised in much broader and less mechanistic terms as providing the, often implicit and unarticulated, background upon which knowledge and action are grounded. In opposition to the representationalist tendencies of the information processing view, taking such an interpretive perspective on schemata connects much more closely with many of the traditions from which practice-based theory draws, including pragmatism, phenomenology, symbolic interactionism, and social constructionism. As such, it offers an appropriate route for pursuing a rapprochement between practice-based and cognitive approaches. The emphasis here shifts from the rule-based processing of information as representations of reality, to the role of interpretive schemas in guiding how unfolding social realities are constituted through processes of enactive sensemaking. Schemata provide the crucial link between past, present, and future that permit both the reproducibility *and* transformational capacity of practices, allowing genuine agency without voluntarism and regularities of action without determinism.

Schemata are crucial for guiding how we orientate ourselves relative to the ongoing stream of experience in which we are caught up. According to James (2000 [1907], p.112, emphasis in original), “[w]e plunge forward into the field of fresh experience with the beliefs our ancestors and we have made already; these determine what we notice; what we notice determines what we do; what we do again determines what we experience; so from one thing to another, although the stubborn fact remains that there *is* a sensible flux, what is *true of it* seems from first to last to be largely a matter of our own creation ... In our cognitive as well

as in our active life we are creative. We *add*, both to the subject and to the predicate part of reality. The world stands really malleable, waiting to receive its final touches at our hands”. There are close similarities here with the writing of Heidegger (1962 [1927]) who argued that people are ‘thrown’ into ongoing situations, a condition of being-in-the-world, in which understanding is necessarily based on making choices guided by pre-existing and prereflective suppositions. There is thus no presuppositionless space through which one can step out of the flux of experience in order to reflect on it. Being is thoroughly temporal in that it always emerges out of a past and tends towards a future. Our experiences are shaped by past experiences and an orientation towards the future in terms of expectations, elements of which are given meaning by our current experiences.

The key insight here is that interpretive schemes are important to our mode of being in the world, being both influence on what we attend to and how we bracket our stream of experience, but also influenced by, reinforced, updated, modified, or overturned by those experiences. However, what these perspectives from pragmatism and phenomenology do not fully address are the social character of interpretation. It is only with later approaches, such as symbolic interactionism and social constructionism, that these insights were put on a more adequately social footing. Mead, for example, argued that “the individual mind can exist only in relation to other minds with shared meanings” (Miller, 1982, p. 5). It is through concrete social experiences, where one learns to take the role of others and jointly negotiate the meaning of situations through a cycle of gesture and response, that a sense of self develops relative to a wider community (Mead, 1913, 1934). In other words, our interpretive schemas are thoroughly social in character, both influencing and being influenced by our engagement in ongoing social experiences. These ideas are extended in the social constructionist concept of the *social stock of knowledge* (Berger and Luckmann, 1966; Schutz and Luckmann, 1973). This refers to a socially shared, but also unequally distributed, accumulation of knowledge comprising semantic fields, classifications, typificatory schemes, recipe knowledge, knowledge about situations, and so on, that is generally taken for granted in one’s routine engagement with everyday life. Underlying this is an assumption of sharedness and the suspension of doubt, whereby the disruptive burden of questioning everything and continuously having to find new ways to act and interact are removed and the “validity of my knowledge of everyday life is taken for granted by myself and others until further notice” (Berger and Luckmann, 1966, p. 58; c.f. Garfinkel, 1967).

While the social stock of knowledge provides a conceptualisation of how routine patterns of activity are reproduced through social interaction, the question remains as to how changes are generated and new patterns encapsulated in a shifting and moving stock of knowledge. One possibility is that changes occur where there are problems or breakdowns as people find that their taken for granted assumptions and ways of doing things are inadequate for particular situations and so they are subsequently updated and revised. Schutz and Luckmann (1973) have also suggested that changes and additions to the stock of knowledge are built into its very operation. This is because the “social stock of knowledge transmitted to the individual relieves him of the necessity of ‘independently’ solving a whole series of important everyday occurrences. As a consequence of this, the individual has in principle the possibility of turning toward ‘new’ and thus not-yet-solved problems that are also perhaps not even recognized” (*ibid.*, p. 298). However, both these possibilities for change effectively come from outside the rules of the game as contained within the existing stock of knowledge; in the first instance because of a mismatch between rule-guided expectations and specific situations, and in the second case because the routinisation of certain everyday activities allows individuals to focus their efforts on other problems.

Subsequent contributions from social constructionism and others have focused on the transformative potential of rules themselves. This possibility arises because of two inherent features of social rules. The first is the understanding that rules are rarely, if ever, comprehensive and able to cover every situation and every eventuality. They are always liable to be misunderstood or misapplied and it would be excessively burdensome, if not impossible, to supply the necessary information to prevent such misunderstandings (as a number of the ‘breaching’ experiments conducted by Garfinkel (1967) clearly demonstrated). Taking inspiration from Wittgenstein, Taylor (1993) has suggested that rules can never contain the principles of their own application. If rules are purely about formal internal representations of what should be done, as the information processing model suggests, then the only way that errors of application can be corrected is through the provision of further rules, which could potentially lead to an infinite regress of rules about rules about rules *ad infinitum*. However, Taylor has argued that rule following is only possible against an unarticulated background of understanding, or ‘form of life’ to use Wittgenstein’s (1953) terminology, comprising an embodied, practical mastery acquired in the form of habits, dispositions, tendencies, and so on. Crucially, the incompleteness of rules and their achievement against a background of practical know-how mean that there is always scope for

improvisation within rule-guided action. The creativity at the core of rule following behaviour is also highlighted by the 'et cetera principle' in ethnomethodology which suggests that communication is usually based on a mutual assumption of incompleteness (Garfinkel, 1967).

The second feature of rules is that they are situated accomplishments that are necessarily tied to specific circumstances. As a result, there is the ever-present potential for change, of a greater or lesser extent and regardless of whether or not it is actualised, because there is always an active role for people in their enactment of rules. As Sewell (1992, p. 20) has argued, "[t]o be an agent means to be capable of exerting some control over the social relations in which one is enmeshed, which in turn implies the ability to transform those social relations to some degree". There have been a number of attempts to represent the distinction between rules as abstract guides for what should be done and rules as concrete enactments. Mouzelis (1995), for example, has distinguished between the paradigmatic and the syntagmatic in relation to social rules. The paradigmatic refers to general rules which can be applied in a variety of circumstances, whereas the syntagmatic concerns actual instances of social interaction which give expression to these rules and independent of which they have no existence. The paradigmatic is associated with the position-role and dispositional dimensions of social action, while the syntagmatic corresponds with the interactive-situational dimension identified by Mouzelis. The position-role dimension relates to normative expectations surrounding particular roles, the dispositional dimension concerns historically acquired schemes of perception, thought, and action, and the interactive-situational dimension refers to the open-ended and contingent enactment of these dimensions through concrete practices of social action and interaction. According to Tsoukas (1996, p.19, emphasis in original), these three dimensions come together in the following way: "human agents *select out* on the one hand what they understand to be the *relevant* aspects of both their role-related normative expectations and their sets of dispositions, and on the other those *relevant* aspects of the local conditions within which their actions take place, and try to fit the two together".

A key issue here is not only that individuals are active agents in the reproduction and potential transformation of social rules and normative expectations, but also that the process of fitting together norms, dispositions, and situations is a crucially interpretive accomplishment. In order to orientate their behaviour by calling upon different normative or dispositional elements that are more or less appropriate to the situation, individuals must first

make sense of the what the situation is, often on the basis of quite fragmentary, fleeting, and incomplete evidence. How one makes sense of situations is, in turn, influenced by what Hochschild (1979) called ‘framing rules’ and Cicourel (1973) termed ‘interactional competence’. In either case it is not only knowledge of the rules that is needed, but also a practical sense of how and where they can be applied. For Cicourel (1973) there is a crucially cognitive dimension to the ability to generate situationally appropriate actions in that both normative expectations and the understanding of situations are guided by interpretive schemata. This is something that practice-based approaches, and sociology more generally, have avoided recognising. Yet, as Sewell (1992, p. 7, emphasis in original) has argued in relation to structuration theory, this leads to something of an omission: “Giddens places a great deal of weight on the notion that actors are *knowledgeable*. It is, presumably, the knowledge of rules that makes people capable of action. But Giddens develops no vocabulary for specifying the *content* of what people know”. Cicourel (1981, p. 101) has made much the same point in suggesting that “[t]aking seriously the notion of schema theory should force sociologists to recognize the necessity of an explicit theory of meaning. Sociological theory often treats meaning as obvious or as a residual category”.

It is, I would argue, by turning to some of the insights of social cognition outlined earlier in the paper that steps can be taken towards developing precisely such an understanding of the role of interpretive schemas in both reproducing and transforming social practices. Ironically, this has already been recognised by a few authors in the practice-based tradition, but rarely taken up. Thus, for example, according to Orlikowski and Gash (1994), it is entirely consistent to bring together the notion of frames or schemas from social cognition with theories of culture and the social construction of reality. The two are complementary not antagonistic: “[w]here cultural and subcultural analyses provide interpretations of contexts – socially established webs of meaning and actions – frames of reference offer a crisp and powerful lens for focusing specifically on how people makes sense of particular aspects of the world” (*ibid.*, p. 178). Importantly, any conceptualisation of interpretive schemas itself benefits from being reciprocally informed by social constructionist and cultural analyses because these help safeguard against turning back towards a static, mentalist, and rationalistic understanding of cognition.

Conclusion

By way of conclusion, I would like to return to consider some implications of the above discussion, and particularly the call for a rapprochement between practice-based and cognitive approaches, for addressing the issue of project team diversity. On the face of it, attempting to combine insights from these two broad sets of approaches would not seem to be an especially fruitful avenue to pursue. After all, there is a gulf dividing the studies on group and team cognition outlined earlier in the paper and practice-based theories of knowing and learning. This is reflected in strong differences in theoretical approach, philosophical assumptions, and style of argumentation. The proposal here is not that the approaches and methods of studies on team cognition should be imported uncritically into practice-based theories *tout court*. To do so would be to be in danger of undermining the strengths of the practice-based tradition and reverting to static, individualistic, and overly rational accounts of organisational similarities and differences where they are treated as universal and essential traits to be manipulated into appropriate combinations so as to promote project team effectiveness. Practice-based approaches encourage a shift from the preoccupation with performance to a concern with *performances*. In this view, project teams are not so much a static collection of variously similar and different individual characteristics that need to be balanced to achieve effective performance. They are dynamic, emergent social settings where similarities and differences are actively constituted, negotiated, and contested through the situated practices of those involved. However, as the previous discussion highlighted, such performances do not take place in an institutional vacuum. The interlocking practices which go to make up project activities are grounded in the ongoing development of specific cultural-historical milieux, that are both reproduced and have the potential to be transformed through the unfolding progression of performances. The suggestion in this paper is that variably shared and distributed interpretive schemata have the potential to act as carriers of cultural-historical regularities, as well as being the dynamic background upon which creativity, improvisation, and innovation in practices are accomplished.

Brought together, a dynamic, situated, interpretive conception of social cognition, with the historically, culturally, and materially sensitive accounts of practice-based theory, are able to offer a rich and detailed understanding not only of how cultural-historical regularities in interpretive schema, rules, and norms are constituted, but also reveal something of the content and distribution of the social knowledge around which collective practices are formed, as

well as the conditions under which interpretive schemas and patterns of activity are reproduced, modified, or transformed. This begins to raise important questions about the nature of project settings compared with other more routine domains of organisational life. According to Meyerson *et al.*, (1996), for example, temporary project teams can not always rely on the gradual sedimentation of routines, norms, conventions, and background knowledge that arguably characterises other more stable forms of organising. As a consequence, they often fall back on typified knowledge of role, position, function, and so on, of co-workers to co-ordinate their activities. In this sense, the interpretive schemas relating to project work are generated beyond the horizon of the project setting (e.g. through processes of professional socialisation and engagement in previous projects) and individuals and groups draw upon these existing typifications to negotiate their way through their current activities. The tendencies here are more reproductive than transformative because, particularly in highly time-constrained situations involving people who have not worked together before, there is little time to develop more detailed, personalised knowledge about those with whom one is working. Interactions are conducted more on the basis of generic subjectivity than situated intersubjectivity (Mead, 1934; Weick, 1995).

However, at the same time, insights from social cognition suggest that the diversity of interpretive schemata in such situations, providing the degree of novelty is not too extreme, is likely to lead to manageable inter-group conflicts and mutual examination of perspectives, challenging existing interpretations and potentially resulting in schema modification. In this case, impulses toward the intense negotiation of perspectives, implied by the various bases around which differences are constituted in project settings, are more transformative than reproductive. Consequently, the conditions encouraged by many multi-functional projects, as both enactments of interlocking routines and interpretive schemata, on the one hand, and sites of intense and sometimes conflict-ridden negotiation around the collective interpretation of situations, tasks, activities, and relationships, makes them thoroughly open-ended endeavours. Of course, the precise ways in which these elements are woven together in the unfolding performances of project work is largely a matter for empirical investigation. However, what I have tried to provide in this paper is a broad framework to guide such a task. Importantly, this is quite different to the calls for more empirical evidence issuing from the literature on team cognition. Contrary to the claims made by some authors in this area, the matter of how to conceptualise team cognition is far from settled. Indeed, without a radical reworking, I would argue that the prospects for further insights are limited.

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