

The Grey Textures of Practice and Knowledge – Review and Framework

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INTRODUCTION

Practice (Schatzki, 2001), action (Collins and Kush, 1998), activity (Engstrom, 1987), routines (Feldman, 2000), habitus (Bourdieu, 1977), situated action (Lave, 1988), knowing (Nicolini, Gherardi, and Yanow, 2003), know-how (Ryle, 1962), practical knowledge (Raelin, 2007), practical intelligence (Scribner, 1986), phronesis and wisdom (Chia, 2009), theories-in-use (Argyris and Schon, 1974), corporeal knowledge (Yakhlef, 2010), and know-how-in-action (Swart, 2011) are some of the concepts developed in order to understand how theory is put into practice¹.

This profusion of practice-related concept theories and the associated new vocabulary enlightens the theory-practice gap research. It achieves this by developing rich accounts of practice and knowledge that consider different world views, units of analysis, and methodological strategies. Paradoxically, this strength constitutes, simultaneously, a weakness since practice-related theories are fragmented as they are rooted in different disciplines, associated with diverse epistemology and ontology. They result in many overlapping, converging and diverging concepts that contribute to the creation of the conceptual and methodological confusion. Additionally, it constrains the operationalisation of practice-related concepts, something that might contribute to generate the ultimate irony: practice theories are unable—or very difficult—to be applied.

¹ See for example the special issues of *Organization* (2000, 2002) *European Business Review* (2008), *Management Learning* (2009) and *Journal of Organizational Change Management* (2011).

Philosophical and sociological accounts of practice form the basis for contemporary practice approaches in management and organisation domain. While the philosophical examinations of practice focus on the reasons, intentions and motives of the concept of practice, sociologists emphasise the consequences of practice, including the role of institutions, conflict, power relations, and social change (Giddens, 1982).

Both management and organisation practice-oriented studies seem to be following diverse paths. For example, some studies approach practice as an object triggering action, producing change and improving organisations; other studies approach practice as ways of seeing (epistemology), looking for understanding and explanations (Corradi, Gherardi and Verzelloni, 2010; Eikeland and Nicolini, 2011).

Furthermore, while the idea of practice is a common denominator of most of the approaches, and there is not yet proper language and logic to adequately express the relational logic of practice (Feldman and Orlikowski, 2011), the concept of ‘practice’ is almost universalistically applied to different situations; they are even related to recognising that contexts, artefacts, agents, and actions might have different qualities, goals and dynamics. However, this obscures the differences between types of agency (Thevenot, 2001), as well as the diversity of contexts, where practices might unfold. In turn, this calls for the recognition of the existence of differentiated forms of practice and knowledge. While there have been significant advances in understanding (why) (Carr, 1980; Starkey and Madam, 2001; Baker, 2008; Ardley, 2008) and addressing (how) (Fendt, Kaminska-Labbe and Sachs, 2008; Fillis and Rentschler, 2008) the gap, the details about how the theory is put into practice remains poorly explained (Brownlie, Hewer, Wagner and Svensson, 2008; Simpson, 2009).

Such a wide spectrum of approaches, research agendas and objects of research requires the need to clearly determine the similarities and differences, as well as the underlying assumptions and goals, of different approaches of practice and its associated knowledge. I argue that because different practice-based approaches stress different parts of the ‘elephant’, practice-based approaches seem to have a complementary character, even in recognising their different epistemologies and ontology.

This paper seeks to clarify the ‘how’ dimension of the theory-practice gap research. It develops a framework that functions like a sorting device. The device considers, simultaneously, knowledge and practice related concepts viewed from different approaches with their variegated epistemologies. In order to address this issue, it is necessary to examine the idea of practice (section 2); and the sociological and philosophical roots of practice (section 3); before examining the mainstream practice-related theories and concepts (section 4). From this examination a framework to assist the categorisation of the wide range of practice-based theories and concepts was developed. Julian Orr’s (1996) ethnographic study, about how photocopy machine technicians develop their work, was used to illustrate the key arguments raised (Section 5). The final section identifies the strengths and limitations of the framework and proposes a research agenda that might be useful to bridge some mainstream concepts, approaches and theories of practice.

ABOUT PRACTICE

The notion of practice has been conceptualised in multiple ways. Practices can be conceptualised either as skill or tacit knowledge that underlies human activities; or as a set of ordering activities bound into practices, including both human and nonhuman artifacts (such as machines and objects); or as arrays of sociomaterial practices inextricably related to other people, contexts and actions (Orlikowski, 2007; Collins and Kush, 1998; Suchman, 2000; Schatzki, 2001; Gherardi, 2006). While there seems to be agreement about the embodied nature of actions, the recognition of practices (as constituted by active ordering processes) and mediated by artifact hybrids and objects, there is significant disagreement about the nature of embodiment, something that is linked to the issue of agency and causality between knowledge and practice.

One way to see the diverse conceptualisations of practice is to read them either ‘from [the] outside’ or ‘from [the] inside’ Gherardi (2009). The ‘from outside’ category focuses on the objective, with regular patterns of activity that support practice reproductions, where structure may be overwhelming, leaving little autonomy and free will to individuals (Thevenot, 2001). The ‘from inside’ category emphasises the practitioners’ view of practice, and provides importance to the emergent and negotiated order that stems from the alignment of human and non-human elements during the deployment of actions. The focus is on the social dimension of knowing, including feelings, senses and emotions. In this practice world,

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Guzman, G. (2013) The Grey Textures of Practice and Knowledge – Review and Framework, *European Business Review*, Vol. 25, N. 5, pp. 429-452.

people act based on a combination of assumptions, rational goals, emotions, intuition, and in view of his/her individual skills, knowledge and ignorance to respond to specific situations. According to rational and non-rational preferences, goals are mediated/enabled/constrained by both other individuals' actions and artefacts that have heterogeneous functions, roles and power positions. This means that uncertainty, conflict and incoherence always permeate the world of practice (Nicolini et al., 2003). Finally, and independently, whether practices are conceptualised from outside or from inside, all practices need to be justified in order to be legitimised (Thevenot, 2001).

Thus, it is possible to suggest that the diverse range of conceptualisations of practice reflects the existence of variegated pragmatism orientations (Fend et al, 2008). Rather than looking for the universal conceptualisation of practice, what is important to discover is the 'capacity of contemporary societies to shift from one pragmatic orientation to another, depending on arrangements specific to the situation' (Thevenot, 2001: 71).

ROOTS OF PRACTICE-BASED CONCEPTS

In order to provide a reasonable account of the idea of practice, it is necessary to review what can be considered the main sociological and philosophical roots of practice and knowing, especially since they inform management-oriented practice frameworks (See Table 1).

Table 1: Roots of practice-related concepts

Author	Concept	Definition
Giddens (1982)	Social action	The world of social practice is simultaneously shaped by both social structures and human agency. The reproduction of social structure takes place through human agency that is manifested in the situatedness of interaction in time and space.
Bourdieu (1977)	Habitus	Habitus are the cultural components that are deposited in social actor's minds and bodies, and that are eventually responsible for these actor's selection and enactment of specific social strategies (Prasad, 2005).
Garfinkel (1967)	Knowledge as situated action	Ethnomethodology is the study of how social structures are produced or accomplished out of the daily social interactions manufactured through language, ideas and action. Field of situations, reflexivity, indexical behaviours

		and accountability are the main components that are fuelled by social processes.
Habermas (1984)	Communicative action	Societies are created and maintained by the social actions of its members. Communicative action involves social actions towards reaching understanding, agreement and consensus in cognitive, interactive, and expressive terms (Prasad, 2005).
Heidegger	<i>Building</i> world-view <i>Dwelling</i> world-view (or being-in-the-world)	The actor has the need to construct mental models of the world prior to any action (Chia, 2009). The state of non-thematic circumspective absorption precludes deliberate conceptualization, reflection and mental representation (Chia, 2009).
Wittgenstein	<i>Relational practices</i>	Practices are relations between people within a particular context. Practices are constituted by objective and subjective momentary reactions and responses that continually connect the person with different kinds of others. Practices are forms of life (Shotter, 1997). The meaning of an idea can only be understood through its use (Collins and Evans, 2007).
Mead	<i>Transactionality</i> <i>Temporality</i>	Social meanings "...are constructed, reinforced and disrupted through our social actions by actors possessing social agency that has the capacity to influence the meanings of social action" (Simpson, 2009: 1334-6). The social act is temporal: "Actors, located between the past and the future, are obliged to continuously reconstruct their histories in order to understand their present transactions. At the same time, they project these understandings into the future to infer the likely outcomes of present actions" (Simpson, 2009: 1338).

Philosophical views of practice have informed most sociological works. That is, most sociological narratives accept Dewey's view that knowledge and practice constitute a sole entity. Wittgenstein's opinion that knowledge can only be learned through practice, and Mead's view of practice, as processes of meaning-making, are informed by the past and

shaped by the future, in which social action has agency (Simpson, 2009; Maines, Sugrue and Katovich, 1983). Heidegger's observation of two dominant world-views about the nature of knowledge and its relationship with practice (the building world view in which knowledge is prior to knowledge, and the dwelling world view whereby knowledge emerges from practice) was a major influence on sociologists' accounts of practice.

At the risk of oversimplifying, it is possible to state that mainstream sociological narratives of practice (Giddens, 1982; Bourdieu, 1977; Garfinkel, 1967) concur on the general nature and features of practice, but do not agree regarding the primacy and causality of practice. Giddens, Bourdieu and Garfinkel accept that knowing and practice are social, tacit, situated, temporal, and interdependent with artefacts, which are embedded in institutions, including culture, but they are diverse concerning the location of the primacy of key components of knowing in practice (Prasad, 2005). Further, Giddens (1982) locates practices in the middle between the actors and the social structures, suggesting that because individuals appropriate and reinterpret structures according to their own agendas, individuals play a key role in the reproduction of structures and actions' outcomes. This appears to mean that Giddens (1982), like Mead, Wittgenstein and Dewey, support the idea of duality, instead of dichotomy, implicitly adhering to Heidegger's dwelling world view.

In contrast to Giddens, Bourdieu (1977) approaches practices as the blend of a set of cultural relations incorporated in individuals' perceptions, evaluations, and actions, developed in social space containing specific power and capital relations (Friedland, 2009). Thus, for Bourdieu, practices are more the outcome of a collective effort in which culture constrains individuals' choices and actions, rather than the result of a specific agent's actions. Departing from Giddens' and Bourdieu's ideas, Garfinkel (1967), rejects the idea of individuals being mostly shaped by both structures and cultural scripts. Instead, he puts agent's actions as the centre of practices, a view that is close to Mead's transaction concept.

The second major difference is related to the issue of causality. On the one hand, Giddens (1982) departs from the idea of agency resulting from calculative individual conduct; he argues that individual agency stems mostly from individuals' capabilities and social competence than from conscious motives of self-interest (Prasad, 2005). On the other hand, the driving force behind practice is, according to Bourdieu (1977), the generic contest for

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domination existing in a plurality of practice fields (Friedland, 2009: 888). Finally, Garfinkel's (1967) position is that practice is not the result of scripts or rules, but is accomplished through the use of a set of individuals' actions, language, interpretations and skills (Prasad, 2005), a view that is similar to Giddens' and Habermas's (1984) communicative action idea.

The above means that any useful view of practice needs to consider both the sociological and the philosophical roots of practice-related concepts, in order to account for the fine commonalities and differences in primacy and causality between and among mainstream approaches. Considering this background, key theories of practice are examined in the next section.

MAINSTREAM THEORIES OF PRACTICE

There is no lack of conceptual models explaining how practices develop, evolve, flow and reproduce; nonetheless, each one emphasises a particular angle. Argyris and Schon (1974) posit that people are usually unaware of the differences between their espoused theories and theories in use. Guérin et al. (2001) proposed a systematic way to assist people to continually compare their espoused theories and theories in use. This method focused on the personal and socioeconomic issues that affect individuals' representations of reality, cognitive know-how and their learning processes. Collins and Kush (1998) proposed the existence of two types of actions: mimeomorphic (that can be done by machines), and polymorphic (that can be done by humans only). This approach overcame the classic dichotomies of practice, such as action versus behaviour, and being-in-the-world versus thinking-about-the-world; it also laid new ground for explaining how humans and machines interact; what humans and machines can do; as well as the processes and limitations of acquiring expertise (Collins and Evans, 2007).

Raelin (2007) sketched a theory of practice that involves using tacit knowledge, critical reflection and mediated actions, mastery and tentativeness. In a similar vein, Sandberg and Tsoukas (2011), following Heidegger (year), developed a comprehensive theory of practice in which people, artefacts and context are inextricably engaged (entwinement), and where sociomaterial practices are approached as embodied, temporal, and as having agency. Further, different forms of reflective practice are suitable for diverse situations. For example, absorbed coping is adequate for non deliberate practices; involved thematic deliberation is adequate for

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temporary breakdowns; and theoretical detachment is suitable for complete breakdowns. Such diverse modes of reflective practice converge with Geiger's (2009) concept of implicit and explicit modes of practice.

Knowing, as the sociology of translation approach (Suchman, 2000; Gherardi, 2006; Nicolini, 2007), emphasises both the situated actions and the action networks that are seen as patterned networks of heterogeneous elements, including people, machines, animal, places and symbols, kept together by active processes of ordering, relationships and performativity. Ordering processes are the outcome of conscious and unconscious, deliberate and emergent operations, processes, and events that do not necessarily align in terms of goals, functions, timing, identities, roles, processes and power relations. In consequence, knowing is approached as an ever contingent process, shaped by ordering and resource restructuring processes *a la* Garfinkel (Nicolini, et al., 2003:18-20).

Stacey's (2001) complex responsive processes idea, and Engestrom's (1987) activity theory, converge regarding the components (i.e. individuals, actions, context, goals, artefacts) and processes (different forms of interaction) for sharing practical knowledge. They, however, diverge regarding the core aspects of practice. Stacey (2001) interprets interaction as both self organizing and having an intrinsic capacity to produce emergent coherence. Activity theory (Blackler, Crump and McDonald, 2003; Engstrom, 1987), on the other hand, places the socially distributed activity system as the central unit of analysis. This unit is culturally situated and mediated by artefacts and language, *a la* Bourdieu. Knowing, in this view, is also contested since it recognises the knowledge-power relationships embedded in the activity system (Blackler et al., 2003; Nicolini et al., 2003). Likewise, Agterberg, Hoof, Huysman, and Soekijad's (2010) model emphasised the key role of interactional processes, highlighting the embedded nature of a structure's organisation and relations.

In a similar line, the community of practice approach (Lave and Wenger, 1991; Wenger, 2000), builds on the idea of situated action (Lave, 1988), as it emphasises the situated nature of the actions, the agent's inter-subjective understanding, and the key role played by social interaction supporting order-creating practices that accompanies resource-distribution processes. Participation, according to Wenger (2000), is the central aspect of group learning. This, however, seems to be problematic, since the role of power issues seems to be

overlooked in this approach. Hence, the communities of practice idea can be cast within a functionalist view of an organisation in which trust, consensus, shared values and common goals are taken-for-granted (Contu and Willmott, 2003; Roberts, 2006; Huzzard, 2004).

Psychological theories (Sternberg et al., 2000; Tobach et al., 1997) adhere to the ‘outside’ view; they converge significantly in respect to both the components and processes to share ‘practical intelligence’, but they focus on individual cognitive abilities. Further, they confer a central role on the individual, the cause of all agency, at the same time they leave a gap in relation to the role of artefacts, actions, other individuals and groups.

The situated action and sociology of translation approaches hold common roots. They emphasise the primacy of emergent and contingent actions; the changing nature of context and settings, and the central role of improvisation, negotiation and persuasion. Situated action and sociology of translation, however, differ in respect to the primacy issue. The former confers a key role on the individuals, while the latter confers equal weight to human and non-human elements (Nardi, 1996).

Finally, activity theory and sociology of translation recognise the importance of the heterogeneous nature of the action network as the key unit of analysis, but differ in terms of causality. The former confers significant explanatory power to cultural and historical events, while the latter confers the same importance to humans and to non-human elements (Nardi, 1996).

Except for the psychological theories mentioned above, all other theories, while adhering to the ‘from inside’ perspective of practice, differ, unsurprisingly, on the primacy and causality issues noted in the classical philosophy and sociology literature. The main diverging salient features of contemporary practice-based approaches refer to: the key role played by individuals’ minds determining actions in the psychological approach; the rule-governed nature of actions in activity theory; the emergent nature of actions resulting from interactions of the persons-in-action-in-setting in situated action; and the heterogeneous action network composed of equally important human and non-human elements in the sociology of the translation approach. Furthermore, while community of practice and situated action emphasises collaboration, the sociology of translation emphasises the role of power

inequalities in the deployment of practices. Table 2 summarises a stylised view of mainstream theories of practice, showing the salient ‘components’ and ‘processes’ that fuel their dynamics.

Table 2: Mainstream Theories of Practice

Author(s)	Components	Processes
Argyris & Schon (1978) Learning Theory	<ul style="list-style-type: none"> • Governing variables • Actions • Consequences 	<ul style="list-style-type: none"> • Single-loop • Double-loop
Collins & Kush (1998) Theory of Action	<ul style="list-style-type: none"> • Intentional actions • Action’s outcomes • Actor • Social forms of life • Actor’s intentionality 	<ul style="list-style-type: none"> • Mimeomorphic actions • Polymorphic actions
Guérin et al. (2001) Work Activity	<ul style="list-style-type: none"> • Task • Work activity • Actions and actions’ representation • Individual • Context 	<ul style="list-style-type: none"> • Regulation of work activity • Confrontation of planned versus real tasks
Raelin (2007) Epistemology of Practice	<ul style="list-style-type: none"> • Conceptualisation • Experimentation • Reflection • Experience 	<ul style="list-style-type: none"> • Tacit knowledge use • Critical reflection • Mastery • Mediated actions • Tentativeness
Sandberg & Tsoukas (2011) Logic of Practice	<ul style="list-style-type: none"> • Engagement with sociomaterial practices • Sociomaterial practices: The social and the material are inextricably related in relational totalities of things, people and actions immersed in context (Orlikowski, 2007). 	<p>Character of engagement</p> <ul style="list-style-type: none"> • Entwinement <p>“...we are never separated but always already entwined with others and things in specific sociomaterial practice world” (p. 343).</p> <p>Conditions for engaging with sociomaterial practices:</p> <ul style="list-style-type: none"> • Business-as-usual (non

		<p>deliberate actions)</p> <ul style="list-style-type: none"> • Temporary breakdowns • Complete breakdowns
Suchman (2000) Knowing as Sociology of Translation	<ul style="list-style-type: none"> • Network of individuals, objects, artefacts, settings • Relationships (human-to-human and human-to-non-human) • Unequal power relations among plural stakeholders 	<ul style="list-style-type: none"> • Stabilisation of heterogeneous human and non-human elements • Social order building
Gherardi (2006) Texture of Practice	<ul style="list-style-type: none"> • Pluralistic discourses and perspectives • Artefacts • Practitioners • Practices • Context • Connective texture of practices 	<ul style="list-style-type: none"> • Categorizing • Highlighting the salient • Producing texts (storytelling and conversations), • Coding knowledge • Enacting identities • Accounts of practices
Nicolini (2007) Work Practices	<ul style="list-style-type: none"> • Activities • Identities • Instruments • Relationships between those involved 	<ul style="list-style-type: none"> • Redistribution of work and tasks • Reconfiguration of identities • Redistribution of power
Stacey (2001) Complex Responsive Processes	<ul style="list-style-type: none"> • Individuals • Tools/artefacts • Context • Symbols 	<ul style="list-style-type: none"> • Cooperative interaction • Competitive interaction • Patterned interaction • Spontaneous interaction
Engestrom (1987); Blackler et al. (2003) Activity Theory	<ul style="list-style-type: none"> • Tools and artefacts • Subjects and objects • Community • Rules 	<ul style="list-style-type: none"> • Interaction (people-people) • Communication • Action
Agterberg et al. (2010) Networks of Practice	<ul style="list-style-type: none"> • Structural embeddedness • Organisational embeddedness • Relational embeddedness • Embeddedness in practice 	<ul style="list-style-type: none"> • Interactions between the four types of embeddedness • Management interventions in either content or connections of the network

Lave & Wenger (1991); Wenger (2000) Communities of Practice	<ul style="list-style-type: none"> • Situated actions, contexts • Social interaction • Reflection • Identity development 	<ul style="list-style-type: none"> • Resource-restructuring • Order-creating practices • Participation
Sternberg et al. (2000) Practical Intelligence	<ul style="list-style-type: none"> • Individuals • Context • Content • Goals • Interpretation 	<ul style="list-style-type: none"> • Adaptation to the environment • Change/adaptation of individual cognitive information-processing abilities
Sylvia Scribner Social Practice (Tobach et al.,1997)	<ul style="list-style-type: none"> • Individuals • Context • Problem 	<ul style="list-style-type: none"> • Variation modes of solution • Adaptation to the environment • Effort saving • Use of situated knowledge
Geiger (2009) Habermasian modes of practice	<ul style="list-style-type: none"> • Individuals • Reflection • Situated context 	<ul style="list-style-type: none"> • Implicit modes of practice: unconscious modes of practice that practitioners do without questioning underlying norms • Explicit modes of reflection: practitioners' explicit questioning of the underlying norms of a particular practice

An examination of the models' **components** suggests more commonalities than differences. Action, individuals, contexts, settings, situations, relationships, tools/artefacts, symbols, reflection, rules, structure, identities, interpretation and embeddedness are the most common components. It must be noted that most of the presented models do agree with this list of components, but they diverge regarding the degree of importance of specific components. Salient differences regarding the components refer to pluralistic discourses and perspectives, rules, structure and connective practices. This indicates that, despite the apparent common ground, current components of practice models are more diversified than they look. This is hardly a surprise since they have different philosophical and sociological roots.

Turning to **the processes** that drive the dynamics of the models, it is possible that while they look divergent, a closer examination of the processes indicate that those divergences have a complementary rather than contradictory character. Three complementary emphases can be distinguished. The first revolves around the notion of actions. Single-loop learning (Argyris and Schon, 1978) and implicit modes of practice (Geiger, 2009) seem to combine with mimeomorphic actions (Collins and Kush, 1998) that follow a patterned interaction mode (Stacey, 2001). Double-loop learning (Argyris and Schon, 1978) seems to be congruent with the polymorphic actions (Collins and Kush, 1998) that, in order to be deployed, demand a comparison plan versus real actions (Guérin et al., 2001), the categorization and highlighting differences (Gherardi, 2006), and the use of explicit modes of reflection upon practices (Geiger, 2009), as well as the application of spontaneous, cooperative, competitive interactions that might have an embedded nature (Stacey, 2001; Engestrom, 1987; Agterbern et al., 2010). Thus, the literature concurs, in general terms, with the processes by which routine and non-routine activities are deployed. However, they diverge on the details about how this evolves. While routine activities are perfectly explainable and follow individualistic objectives and structural deterministic approaches, non-routine activities require using subjective socially-oriented and non-deterministic approaches; they account for the complexity of human interaction. The key aspect of any analysis of practice, therefore, refers to the need to be aware of the ever shifting character of practices and the type of context in which the practices evolve.

The second emphasis gyres around micro stabilization and the social ordering processes embedded in any social action. Some models clearly indicate that social action involves the building of social order (Lave, 1988); the stabilization of heterogeneous engineering elements (Suchman, 2000); and the redistribution of work, tasks and power relations (Engestrom, 1987; Nicolini, 2007), that, in turn, need accounts of practice (storytelling and conversations), as well as identity enactments (Gherardi, 2006). These processes are constrained, situated by structurally embedded circumstances (Agterberg et al., 2010). Hence, both stabilisation and social ordering, embedded in the processes of deployment/enactment/flow of practices, are central elements that require consideration (e.g. either by establishing coping complying or competing strategies) in any practice model.

The third emphasis refers to the critical idea of reflection (Raelin, 2007; Suchman, 2000, Gherardi, 2006; Lave, 1988), the regulation of work activities (Guérin et al., 2001) or reflective practice (Yanow and Tsoukas, 2009). Reflective practice refers to the questioning of the taken-for-granted assumptions, frames and mental models; these involve the exploration of alternative explanations, logics and ‘ways of seeing’, ideas or arguments, as well as attention and responsiveness to salient events, (Yanow and Tsoukas, 2009). Reflective practice might involve, for example, developing alternative ways to perform activities in order to cope with unexpected situations, which the prescribed tasks cannot consider, as well as the breaking of established rules to solve problems on the spot and, consequently, adapt performing the action to the specific local conditions (Guérin et al., 2008). Thus, reflective practice is closely linked to tacit knowledge, mindfulness and practice (Gherardi, 2006), especially since reflecting about an ongoing practice means knowing. Mindfulness is a pre requirement for reflective practice, while reflective practice has a strong tacit component.

While most studies agree about the relevance of reflection, they focus on different aspects of the reflective process, and stress different forms of reflection (see Table 3). The review of reflection related concepts reveals that reflection is usually investigated using comparative processes, that is, ‘during actions’ versus ‘after actions’; yet most research on reflection has focussed on reflection after actions (Jordan et al., 2009).

Table 3: Reflection related concepts

Author(s)	Key Concepts	Explanation
Guérin et al. (2001)	Regulation of work activities	<ul style="list-style-type: none"> • Adaptation strategies are deployed by the individual in order to manage the gaps between prescribed and real tasks. • Adaptation strategies depend on the individual’s mechanisms for explorative perception, information processing, physical activity capacities and intentions. • Adaptation strategies are deployed depending on the connections between the representation of reality and the set of actions being performed by the individual.
Yanow & Tsoukas	Reflection- <i>on</i> -action	<ul style="list-style-type: none"> • Reflective practice is composed by both

(2009)	Reflection- <i>in</i> -action	<p>reflection <i>on</i> action (i.e. post-fact) and reflection <i>in</i> action (i.e. during).</p> <ul style="list-style-type: none"> • Reflection-<i>in</i>-action includes an evaluative dimension (reflecting), different forms of ‘surprise’ (from malfunction to total breakdown), and several forms of improvisation (from non-deliberate to explicitly intentional).
Kokkakis et al. (2008)	Reflection and tacit knowledge	<ul style="list-style-type: none"> • Unready-to-hand tacit knowledge (occurentness) is knowledge that remains tacit, but becomes the focal point of attention and reflection in the case of major breakdowns or disturbances. • Ready-to-hand tacit knowledge is knowledge that remains tacit and unreflected in the case of minor routine malfunctions.
Sandberg and Tsoukas (2011)	Modes of engagement with sociomaterial practice	<ul style="list-style-type: none"> • Absorbed coping: dealing with the world non deliberately. • Involved thematic deliberation: dealing with the world during the event. • Theoretical detachment: dealing with the world after the event.
Jordan et al. (2009)	Reflection and mindfulness	<ul style="list-style-type: none"> • Mindfulness in interaction occurs when there is explicit opportunity to question expectation routines and evoke awareness of context. • Mindfulness in embedded rules and routines occurs when organisation-wide rules regulate interactive routines and individual mindfulness.
Endsley (2006)	Situation awareness (SA)	<ul style="list-style-type: none"> • SA is “the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future” (p. 634). • Both the environment (capability of the environment to provide needed information, and the complexity of the situation) and the individual (perceptual and cognitive

		limitations, expectations) features, influence the level of the SA developed.
Geiger (2009)	Habermasian perspective of reflecting	<ul style="list-style-type: none"> • “A switch from implicit modes of practising to explicit modes of reflection, which occurs when validity claims can no longer be repaired with everyday routines. This can be build through argumentation that evolves within deliberate democracies”. • “The interplay between practising and reflecting helps people understand how breakdowns in the texture of a practice are mended” (p. 136-9).

Sandberg and Tsoukas (2011), Yanow and Tsoukas (2009), and Geiger (2009) argue from similar view points. Implicit modes of practice (Geiger, 2009) or absorbed coping (Sandberg and Tsoukas, 2011) entail the automated reflection that occurs during non deliberate actions. Two explicit modes of practice were devised by Geiger (2009). First, reflection-in-action (Yanow and Tsoukas, 2009) is reflection during action that involves coping with an ongoing temporary mild malfunction of the system. Sandberg and Tsoukas (2011) called it involved theoretical deliberation. Second, reflection-on-action (Yanow and Tsoukas, 2009) is post fact reflection that evolves when a major breakdown occurs. In this case theoretical detachment is required (Sandberg and Tsoukas, 2011).

Unready-to-hand tacit knowledge (Kokkakis et al., 2008), routines that organise mindfulness (Jordan et al., 2009), and implicit modes of practice (Geiger, 2009), seem to be adequate for supporting reflection-on-action processes. These processes are necessary if people are to cope with major breakdowns or disturbances, or in novel situations, where there is likely to be a low level of integration between situation awareness (Endsley, 2006), decision-making action, and outcomes (Guérin et al., 2001).

Similarly, ready-to-hand tacit knowledge (Kokkakis et al., 2008), mindfulness in interactions (Jordan et al., 2009), and explicit modes of reflection (Geiger, 2009) are likely to be fit for aiding reflection-in-action processes that, in turn, are necessary to deal with minor routine malfunctions. Consequently, those modes of tacit knowledge, mindfulness and practice are

adequate to deal with practice in familiar situations, where there is significant integration between situation awareness (Endsley, 2006), decision-making action, execution and control of outcomes. Generic know-how is usually applied and, because the situation is stable, it is possible to anticipate how the diverse elements of the situation may fit and perform. This suggests that reflection is often more unconscious and automatic (Guérin et al, 2001).

In summary, the examination of reflection related concepts recognises the variegated forms of reflection; it also shows that all authors reviewed in Table 3 implicitly or explicitly adhere to Heidegger's being-in-the-world view. They agree on the character of reflective practice modes and on the mechanism used to reveal the practice (c.f. Keevers and Treleaven, 2011). On one hand, there are automatic modes of reflection that are used during the execution of routine practices. On the other hand, there are deliberate modes of reflection that are provoked by minor or major breakdowns, interruptions, or novel situations. Simultaneously, automated and deliberated modes of reflection play differentiated roles in the process of turning knowledge into practice (Kokkakis et al, 2008; Yanow and Tsoukas, 2009; Sandberg and Tsoukas, 2011). Two key questions are: what role do the diverse reflection modes play? and how does this happen in different practice models? Thus, significant implications are in action when adopting one or another model in studying practices, knowledge and associated reflexion modes. While it goes beyond the scope of this study to suggest the models that are more appropriate for specific situations, the complementary character of reflexion modes calls for a dialectical view of practice and knowledge.

PRACTICE AND KNOWLEDGE – An Integrative Framework

In this section, I aim understand further the emerging practice-based concepts. Considering the epistemological and ontological stances taken by particular practice concepts and theories, the notion of practice has been deconstructed. Additionally, the most relevant practice-related concepts have been mapped onto a framework that functions as a sorting device to aid our understanding of the wide range of practice-related concepts. Three assumptions underpin the framework. First, adhering to Wittgenstein, it is posited that an idea can only be understood by using it, and actions can only be comprehended by doing them. Second, both practice and knowledge can be more explicit or more tacit in different degrees (Polanyi, 1983). Third, practices shape, and are shaped, by contexts in diverse ways (Giddens, 1982).

The framework is based on two key concepts that are intimately connected: practice and knowledge (Guzman, 2009). The separation of knowledge and practice is purely for analytical reasons, since practice and knowledge are two sides of the same coin. A narrow concept of practice is used, without throwing away the knowledge baby with the bath water. Hence, practice is conceived as performativity. That is, practice is conceptualised as a set of intentional actions that are mediated, or not mediated, by artefacts, and these actions make-sense in the social setting where they are deployed (Schatzki, 2001). Consequently, practices are seen, separately, as: a performative set of actions; social enactments that include meaning and sense making processes; cognitive knowledge; and embodied knowledge that accounts for feelings, sense, kinetics and aesthetics. The knowledge dimension of practice is considered separately in the framework. Practice can also have explicit and tacit dimensions (Eraut, 2000).

Arranging knowledge and practice as the first axis, with the explicit and tacit dimensions as the second axis. The result is a two-dimensional framework useful for sorting out the variegated practice-related concepts and theories, considering their particular epistemologies and ontology (see Figure 1). Orr's (1996) study into photocopier machine technicians is used to illustrate the archetypal situations.

This framework must be read from top to down only. Two disclaimers are notable. First, knowledge and practice, rather than clearly demarcated, are in the real world one single entity since one cannot exist without the other one. Second, rather than a being a dichotomy, the explicit versus tacit dimensions must be seen as a continuum in order to reflect the extent to which both knowledge and practice can possess various degrees of explicitness and or tacitness. Thus, the deconstruction of the knowledge practice idea was developed to create meaningful categories for analytical purposes only.

	EXPLICIT	TACIT
K N O W L E D G E	<ul style="list-style-type: none"> • Procedural knowledge (Cohen & Bacdayan, 1994) • Know-how (Ryle, 1962) • Discursive consciousness (Giddens, 1982) • Spoused theories (Argyris & Schon, 1974) • Encoded knowledge (Blackler, 1995) • Episteme (Chia, 2008) <p style="text-align: right;">1</p>	<ul style="list-style-type: none"> • Knowing (Berragan, 1998; Nicolini et al, 2003; Gourlay, 2004) • Theory-in-use (Argyris & Schon, 1974) • Phronesis (Chia, 2008) • Practical knowledge (Scribner, 1986) <p style="text-align: right;">2</p>
P R A C T I C E	<p style="text-align: right;">3</p> <ul style="list-style-type: none"> • Mimeographic actions (Collins & Kush, 1998) • Techne (Chia, 2008) • Instrumental action (Habermas, 1984) • Know-how-in-action (Swat, 2011) • Explicit modes of practice (Geiger, 2009) 	<p style="text-align: right;">4</p> <ul style="list-style-type: none"> • Polymorphic actions (Collins & Kush, 1998) • Embodied knowledge (Yakhlef, 2010; Blackler, 1995) • Metis (Chia, 2008) • Practical consciousness (Giddens, 1982) • Exceptional know-how-in-action (Swat, 2011) • Implicit modes of practice (Geiger, 2009)

Figure 1: Practice and Knowledge—An integrative framework

1: Explicit Procedural knowledge

2: Tacit Procedural Knowledge

3: Explicit Practice

4: Tacit Practice

Source: Developed for this study

The knowledge dimension has been separated into explicit and tacit knowledge, since knowledge can be—in different extents—both explicit and tacit (Polanyi, 1983).

In the explicit dimension of knowledge, the concepts of procedural knowledge (Cohen and Bacdayan, 1994), know-how (Ryle, 1962), discursive conscientiousness (Giddens, 1982), spoused theories (Argyris and Schon, 1974), encoded knowledge (Blackler, 1995), and episteme (Chia, 2009) can be located. Those concepts provide a notion of cognitive knowledge that is explicit to a significant degree and, therefore, can be readily applied in different contexts. This knowledge is usually consciously applied in order to perform deliberate, rule-governed actions. I call it procedural explicit knowledge, because knowledge in this quadrant can be explicated to a significant extent; also it can be deliberately shared and applied, even imperfectly. Hence, knowledge precedes practice.

Orr's (1996) study documented well this form of knowledge. One copier repair technician presented particular practical knowledge about how to proceed to fix a specific copier problem; he articulated and explained that:

“As we go out to get his parts, we talk. I ask about the fix for the loose gear. He will fix it by shimming the shaft with a piece of plastic banding material. There will be a retrofit, a new gear with a metal insert, but until it arrives in the field, this works very well” (p. 48).

In the tacit dimension of knowledge, the ideas of knowing (Nicolini et al., 2003; Gourlay, 2004), theory-in-use (Argyris and Schon, 1974), phronesis (Chia, 2009), and practical knowledge (Scribner, 1986) represent knowledge that is mostly tacit. As such, it can be highly subjective and impossible to articulate, since meaning, interpretation, values and assumptions about how the world works are fundamentally individually interpreted. In this case, uncertainty is recognised, multiple interpretations are legitimate, ambiguity is inevitable, and limited rationality is accepted (Garfinkel, 1967). This process encompasses not only cognitive knowledge about how to do practical actions, but also pre-reflective knowledge (such as intuition and feelings) that cannot be verbalised and/or explained. The knowledge is either consciously or unconsciously applied in order to cope with emergent and situated actions. I call it procedural tacit knowledge. The literature provided an overview of the important advances in comprehending tacit procedural knowledge that accompanies practice. Coming from different traditions, Scribner (1986) and Schon (1983) converge on the importance of the individual's abilities to formulate problem-solving processes by experimenting and reframing situated problems, and the use of their own practical skills to solve the same problem in different ways in order to cope with the changing and uncertain situations.

Tacit procedural knowledge is difficult to represent. The situation of the existence of excessive free play of the shaft described by Orr (1969) illustrates this point. “After the technician feels the free play of the shaft, he wiggles the shaft (to demonstrate this freedom to the researcher/ethnographer):

-Ethnographer: And where is it misadjusted? Where is the adjustment?

-*Technician*: ...it's a D-shaft in back...it's got a plastic bearing that drives it.

-*Ethnographer*: Uh-huh.

-*Technician*: OK, and the flat on the D-shaft...wear out that flat on the...the pulley, the gear, and gradually enlarges it" (p. 118-9).

In order to understand the excessive free play problem, Orr explains two further points. The first is that the shaft ends in a D-section, something that is directly connected to the development of free play. The second is that the bearing is plastic, which helps to understand "...how the flat of the (steel) D-shaft wears out the (plastic) flat in the matching item..." (p. 119).

Turning attention to practice, the explicit dimension of practice emerges when an individual purposively applies explicit procedural knowledge in order to perform actions; hence, he/she is able to explain, significantly, how the set of actions was done. Because explicit practice is made up of mimeomorphic actions (Collins and Kush, 1998) that are driven by conscious, reason-dominated explicit procedural knowledge; practices in this group are goal-oriented and can be established by logical rules (Spender, 2005). Explicit practice, therefore, overlaps with Habermas's (1984) 'instrumental action' idea, and is close to Bourdieu's (1977) ideas regarding the routine nature of practices. The notions of *techne* (Chia, 2009), instrumental action (Habermas, 1984), routines (Feldman, 2000), know-how-in-action (Swart, 2011) and explicit modes of reflection upon practice (Geiger, 2009) are closely related to the idea of explicit practice.

The tacit dimension of practice, on the other hand, is triggered when tacit knowledge, gained through previous experience, is effortlessly applied subconsciously, in order to perform a set of polymorphic actions (Collins and Kush, 1998). The individual is unable to explain how these actions were performed since they involve feelings, senses and skills developed through our body (Eraut, 2000). Yakhlef (2010) called this corporeal knowledge; Blakler (1995) embodied knowledge; Chia (2009) *metis*; Geiger (2009) implicit modes of practice; Swart (2011) exceptional know-how-in-action; and Giddens (1982) 'practical consciousness'. Moreover, there are two forms of tacit practice. In the first, practice is mostly explorative, intuitive, and deals with emergent situations as events unfold in time and space (Spender, 2005). Actions, therefore, are most likely to be polymorphic since they need social

understanding of the specific situation where it occurred in order for it to be performed. The second form of tacit practice is made up of actions that are, either deliberately or intuitively, not performed in order to achieve a specific outcome. Polymorphic non-actions are necessary since social understanding of the specific situation, and the accumulated previous experience, is needed. Some aspects of the tacit dimension of practice can be illustrated using Orr's (1996) study.

“The technicians’ relationship with the machine is partially kinaesthetic, knowing how the machine should feel...the diagnosis leading to the shimmy mentioned above involves wiggling the shaft; the presence of excessive play indicates the need for repair, but knowing how much play is too much requires a sensitivity to the feel of the mechanism” (p. 98).

In another situation Orr describes the crucial role of the machine's sounds to determine the type or source of the problem:

“In several diagnoses that I observed, the noises produced at different stages of the process proved to be an invaluable guide to what is happening or not happening. One set of sounds indicates where the problem occurs, another indicates a particular sort of problem, and yet another indicates that the controlling logic has just crashed...Perhaps more obvious are the sounds of mechanical distress, as mechanisms bind, bearings go bad and squeal, or pins slip out to stop the rotation of a shaft completely while an overzealous drive belt thumps away, skipping one tooth at a time” (p. 98).

Having mapped knowledge and practice concepts into the framework, three key aspects will be highlighted in the next section. First, caveats about the categorisations of the concepts are explained. Second, the explicit and the tacit dimension of knowledge and practice are further characterised. Third, relationships between the explicit and the tacit dimension are further discussed.

DISCUSSION

Because the social world is far from ordered (Law, 1994), it is not possible to expect all practice and knowledge-related concepts, mapped onto the framework, to neatly fall into one or another category. Whilst most of the concepts were categorised fairly into the framework, some concepts crossed the explicit and tacit dimensions, while others crossed the knowledge and practice dimensions. Argyris and Schon's (1974) theory-in-use, for example, can be

represented at both the tacit procedural knowledge and the tacit practice dimensions, especially since theory-in-use is both practice and knowledge behind the actions (knowing). Mimeomorphic and polymorphic actions might also cross the explicit and tacit dimensions. While most mimeomorphic actions are explicit and most polymorphic actions are tacit, some repertoires of mimeographic actions can be too complicated to be codified, looking like polymorphic actions. Furthermore both mimeomorphic and polimorphic actions are independent of being performed either intentionally or unintentionally (Collins and Kush, 1998). This means that advanced categories must be seen more as temporary signposts that assist to orientate practice-based studies, rather than as a rigid prescriptive model.

Turning our attention to the explicit and tacit dimensions, it is worth noting that the explicit dimension (Quadrants 1 and 3) of knowledge and practice seem to adhere to the ‘outside’ (Gherardi, 2009) perspective of practice (e.g. Stenberg et al, 2000), since both knowledge and practice can be explained and codified. This means that the explicit dimension accounts for knowledge and practices that usually demand, mostly, automatic cognition since context and its socio-material elements are mainly stable. Feldman and Pentland’s (2003) ostensive routines seem to match this form of practice and knowledge. Hence, the explicit dimension of knowledge and practice appear to adhere to the idea of knowledge as the product of conscious individuals, where practices are rule-governed, *a la* Giddens (1982), and knowledge precedes practice *a la* Heidegger’s building-the-world view.

Conversely, the tacit dimension of knowledge and practice (Quadrants 2 and 4) seems to match the ‘inside’ perspective (Gherardi, 2009). This practice and knowledge are conceptualised as subjective, abstract, and highly dependent on social interaction, and constrained by other agents, including artefacts norms and context situations. Thus, the tacit dimension of knowledge and practice accounts for non-routine actions and practices that are usually needed to address innovative activities (Eisenhardt, Furr and Bingham, 2010) and unexpected events (Weick and Suttcliffe, 2007) through deliberative cognitive modes. Feldman and Pentland’s (2003) performative routines seem to match this form of practice and knowledge. Consequently, practices, rather than only the individual, have primacy over cognitive knowledge, like Mead’s social agency idea (Simpson, 2009) and Heidegger’s dwelling-in-the-world view. Therefore, practices can be seen as having agency *a la* Garfinkel (1967).

The explicit and tacit dimensions follow different epistemologies. Rather than viewed as dichotomic concepts, they must be approached as a duality (Schultze and Stabell, 2004) since both practice and its associated knowledge can sometimes be more tacit, subjective and socially dependent than articulable, codifiable and independent of the context, and *vice versa* in other instances. This notion is in line with the idea that knowledge is both tacit and explicit, simultaneously (Polanyi, 1983), and that practices can take different forms—from more articulated, explicit, agreed, stable, and independent of the situation, to more subjective, abstract and dependent on the interaction of social norms, as well as past events and relations (Thevenot, 2001; Simpson, 2009; Collins and Kush, 1998; Gherardi, 2006). One way to relate explicit and tacit forms of practice and knowledge is to associate those constructs to the ideas of organisational exploration and exploitation (March, 1991). It is suggested that explicit-oriented practice and knowledge seem to be suitable for supporting routines that aim at maintaining organisational exploitation in stable contexts. Conversely, tacit-oriented practice and knowledge seem to be more adequate for routines that support the creation of organisational exploration in dynamic contexts (Rosenkopf, 2008; Turner and Rindova, 2012).

Organisations that follow the exploitation strategy focus on efficiency and improvement (March, 1991), something that demands external knowledge acquisition and assimilation. This requires the development and set up of standardized and reorganized routines that support consistency and the improvement of operations (Turner and Rindova, 2012). Standardizing involves the use of standard operating procedures and formal rules that assist to standardize both employee and customer behaviour. It also involves the use of the same standard operating procedures and rules to generate efficient responses to change (reorganizing). Prioritization and contingency rules, for example, enable discretion and deliberation, while preserving core standard routines. The development of standard operating procedures and rules, however, is feasible mostly because knowledge and practice associated with them is mostly explicit. Standard operating procedures and rules are generally constituted by what I have called explicit procedural knowledge and explicit practice (Figure 1). Being aware of the quality of knowledge and practice is important for selecting adequate learning and sharing mechanisms. Thus, benchmarking, marketing alliance licensing, and

process maps, for example, are learning mechanisms; these are adequate for codified-oriented knowledge and practice.

Differently, organisations that pursue exploration strategies, aim at achieving flexibility, discovery and innovation (March, 1991), something that calls for tacit knowledge generation transformation and circulation. The deployment of exploitation strategies, therefore, requires the development and set up informal connections that support a shared understanding for change, through the coalescing and reconstituting of routines (Turner and Rindova, 2012: 35-6). Coalescing involves the development of social capital within teams through explicit and implicit agreements. The reconstitution of routines, on the other hand, involves the set up of connections to support collective sense making about change, as well as to enact revised action patterns. Furthermore, shared understandings, social capital, implicit agreements and collective sense making are constituted by what I have called tacit procedural knowledge and tacit practice (see Figure 1). This, in turn, calls for the application of tacit-oriented learning mechanisms, such as communities of practice, on-the-job training, and the collocation of experts among others.

Nevertheless, because organising encompasses change and stability simultaneously (Leana and Barry, 2000), there is a demand for balancing exploration and exploitation strategies (March, 1991). The idea of ambidextrous organisations (Birkinshaw and Gibson, 2004; O'Reilly and Tushman, 2004) helps to illustrate how organisations manage the exploration exploitation paradox. Within this scenario, it is important to know how to differentiate explicit-oriented situations from tacit-oriented situations in order to understand the conditions and cognitive modes that support switching cognitive gears (Louis and Sutton, 1991). This also implies the switching of epistemologies (Thevenot, 2001). A key issue here is that our default automatic cognitive mode works well, but in stable contextual situations only. Conscious cognitive modes are generally more adequate for dynamic situations.

Conditions that provoke switching cognitive gears from automatic to conscious include: an unfamiliar unique or novel situation; discrepancy between expectations and reality, or unexpected disruptions; and deliberate thinking provoked by an internal or external request. Further, individual predispositions and organisational characteristics also influence cognitive gear-switching capacities (Louis and Sutton, 1991; Geiger, 2009). On the one hand, individual

cognitive processes handle the contradictory worlds of exploitation and exploration, and involve the interaction of two opposed, but complementary, cognitive mechanisms: differentiating and integrating (Smith and Tushman, 2005). Differentiating entails recognizing distinctions and articulating new categories, while integrating involves developing conceptual connections among different perspectives. The notions of mindfulness (Langer, 1997), the regulation of work activities (Guérin et al, 2001), and situated awareness (Endsley, 2006) seem to converge with differentiating, since it involves openness to novelty; alertness to distinctions; and sensitivity to different contexts and awareness to multiple perspectives. On the other hand, organisational characteristics, such as the extent to which organisational norms and boundaries are flexible, for example, also influence cognitive gear-switching capacities (Louis and Sutton, 1991: 60).

This suggests that the explicit and tacit dimensions of knowledge and practice are both complementary and useful for different purposes. Hence, they need to be jointly understood as most social world situations are in the extensive grey area, between stable and dynamic contexts, which calls for the simultaneous application of exploration and exploitation strategies.

CONCLUDING REMARKS

The aim of this paper was to review the knowledge and practice related literature, as well as to develop a theoretical framework that functions like a sorting device, in order to improve our understanding about how theories are turned into practice. By organising a wide range of knowledge- and practice-related concepts into meaningful categories, this paper contributes to overcoming the use of the concepts of knowledge and practice as universal; it discusses the relationships between diverse forms of knowledge and practice, and it elaborates the cognitive mechanisms used to know how to shift from the inside to the outside view, and *vice versa*. The de-construction of the generic concepts of knowledge and practice, in more refined categories, also brings research implications.

The proposed conceptual framework is seen as enlightening the theory-practice gap by considering diverse context-situations. Although theories are put into practice, always within specific context-situations (Tsoukas and Hatch, 2001), context-situations might change and, therefore, can affect and be affected by the how theories which are put into practice (Letiche

and Lissack, 2009). As a consequence, the way a particular theory is put into practice it will be different in diverse context-situations. By recognising the implicit epistemological stance associated with the diverse theories and concepts, the framework may be useful in selecting the most suitable practice concepts and theories for specific situations, especially since they are not universal and are usually developed with different purposes. Broadly speaking, organisations performing in stable and simple contexts, and pursuing exploitation strategies, might be benefited by applying explicit-oriented tools and concepts. Similarly, organisations evolving in dynamic and complex environments, and following exploration strategies, might benefit by using tacit-oriented tools and concepts.

The recognition of the diverse forms of knowledge and practice might also inform the current debates in the artificial intelligence (AI) community, about the possibility to develop computer models of the mind (c.f Tallis and Aleksander, 2008; Hoffmann, 2010). Beyond the philosophical reasons that constrain this endeavour (c.f. Dreyfus, 1992), the proposed model has the capability, in the AI community, to set realistic knowledge- and practice-related limitations for assisting in the differentiation of the forms of knowledge and practice. Hence, it is possible to automate from the ones that are not possible to automate (e.g. Collins, 1990).

Nonaka and Takeuchi's (1995) SECI model might also benefit by considering the diverse forms of knowledge and practice advanced in the proposed framework, instead of treating all knowledge and practice, as if they were uniform in all situations. Ribeiro and Collins (2007), for example, showed how Nonaka and Takeuchi's (1995) knowledge conversion is, in reality, a re-distribution of the roles between humans and machines (combined with ordering and stabilising the inputs/outputs and the non-human elements). Repetitive and, therefore, codifiable actions were assigned to the bread-making machine, while the non-repetitive tacit-oriented practices remained the tasks undertaken by the humans. It goes without saying, therefore, that the reconceptualization of the SECI model has potential significant implications for knowledge transfer studies that use Nonaka and Takeuchi's model.

Finally, the framework can be used to deconstruct sophisticated management models in order to produce a more encompassing explanation about their dynamics. The implementation of lean production, for example, would benefit from the use of practice and knowledge concepts that account for the finely crafted balance between exploration and exploitation strategies that

appear to be accomplished by the successful application of lean production. The lean model is constituted by a rich set of rules, procedures and principles that involve both explicit and tacit procedural knowledge, as well as explicit and tacit practice (Fujimoto, 1999; Osono, Shimizu, Takeuchi and Dorton, 2008). The differentiation of diverse types of knowledge and practice would assist in the selection of the most adequate learning mechanisms for diverse components of the lean model. Therefore, Collins and Kush's (1998) action theory, Argyris and Schon's (1974) learning theory, Engestrom's (1987) activity theory, and Agtenberg et al's, (2010) embeddedness theory, for example, seem to be able to cope with both the explicit and tacit forms of knowledge and practice, embedded in the lean model, in order to account for the co-evolution of process manufacturing consistency and learning capability development (Coriat and Dosi, 1999).

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