Chapter 8
The Complex Systems of Practice

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Introduction

The philosopher and social theorist Theodore Schatzki, in surveying the way in which the concept of 'practice' is understood in current social theory, describes views of practice as constituting a diverse field but concludes that most of these views are centred on practices as 'embodied, materially mediated, arrays of human activity centrally organised around shared practical understanding', albeit with debates about how to understand the significance of both embodiment and 'materially mediated' (Schatzki 2001a: 11).

This understanding of practice has a broad reach. One of the things it does is to raise the issue of meaning in relation to practice. It places the activity of 'shared practical understandings' centrally. 'Understandings' suggests that the instantiation of meaning is an 'activity' of practice underlying the activities or behaviours displayed in the performances of a practice. That they are 'shared' means that practice is a social function but is extended by embodiment to implicate bio-psychological functioning. It also implicates, by extension of 'material mediation', the attribution of meaning to material entities giving them a role in social life (Schatzki 2001b).

A second aspect of Schatzki's understanding of practice relates to the epistemological framework that is needed for practice. He includes both of the phenomena 'social orders' and 'mind' (Schatzki 2001b). These are commonly conceptualised from within different epistemological frameworks. In his own account of practice, Schatzki places practices at the centre of human social life and argues that practices interact with each other to form a field, which can be understood as 'the social'. Practices are linked with both social orders and with mind understood as a non-substantive,

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non-causal conception, a relational 'states of affairs' of 'how things stand or are going for that person in his or her involvement in the world' (Schatzki 2001b: 57). If the field of practices then provides a 'context' for both social orders and mind, then practices can be understood as both *differentiated from and linked to* both. This understanding raises the issue of how these differing aspects of human functioning can be considered together in an account of practice without either a reduction to individualism, or the commonly used equivalent alternative, of a 'reduction to the social'.

This chapter takes up the two linked issues of how practice can be conceptualised and what onto-epistemological framework is useful in this task. How to conceptualise practice involves addressing the function of meaning in practice, where practice is understood as having a social basis, yet involves individuals, not as generic agents but as specific, embodied, socially influenced but self-directing agents. Addressing meaning in practice involves a re-consideration of an aspect of embodiment, that of bio-psychological functioning. It will be argued that meaning is socially produced or shaped through the partial 'sharing' of individuals' affective processing with others in groups basic to human functioning. Such engagement in the production of meaning, in turn, allows the individual to be a participant in the evolution of a practice and a performer of that practice. It also involves the argument that shared affective processing is the social function by which meaning comes to be created, re-created through interpretation and instantiated in all aspects of social life, from the transformation of aspects of the natural world into material tools, to the creation and evolution of culture.

One onto-epistemological framework for understanding practice as encompassing both individual functioning and social processes is complexity. However, to utilise complexity effectively for this purpose, it needs to be formulated less reductively than it commonly is. This chapter will first outline the features of complexity, as it is commonly understood in social sciences, an understanding derived directly from the natural sciences. It will be argued that this usual conceptualisation is based on a reductive understanding of the relations that underlie complexity, and that it is this that limits its use in the social sciences. A less reductive understanding of relations is available, in the form of the pragmatist philosopher John Dewey's conceptualisation of 'trans-actions'. These relations both *link and differentiate* the parties to the relation. Understanding complexity as being based on complex relations, for which trans-actional relations are an exemplar, allows a formulation of complex systems that can be used for an encompassing but non-reductive understanding of practice.

Complexity

'Complexity' is an umbrella term for a conceptual field that is derived from multiple disciplines across the natural sciences, mathematics, philosophy and the social sciences. Central to an understanding of complexity is that it takes *relations* as a basic ontological unit rather than *substance, things* or *entities*, as in traditional, substantialist

Western ontologies (Emirbayer 1997). Relations implicate systems: wherever relations are found, what is present can also be conceptualised as a system of some form. For example, a couple, an 'entity' with internal relations, can also be conceptualised as a two-party system. From a complexity perspective, systems are conceptualised, not as being built up out of entities, although entities form part of the system, but as being structured by the relations of the system and the patterns that those relations produce over time.

Work using the methodologies of mathematics and the natural sciences has shown complex systems to be characterised most significantly by the following key ideas: non-linearity of internal relations, 'attractors', 'self-organisation', existence at 'far-from-equilibrium' states and 'emergence' (Goldstein 1999).

Non-linearity

Taking relations rather than entities as the primary ontological unit introduces the asymmetrical dimension of time, which highlights the non-linearity of relations prior to the methodological manipulation that produces linear relations. Relations understood as non-linear are recursive, so output feeds back into the process of the relation, an influence that may be direct or indirect, enhancing or dampening. In this conception, relations are not logically reversible; causes and effects do not have the epistemological equivalence of a linear relationship, so small differences in initial conditions of a system of complex relations may lead to unpredictably different outcomes.

Attractor

When a non-linear equation is solved using the appropriate mathematics, what is produced is not something numerical but a pattern, in multiple dimensions. This pattern represents the long-term dynamics of the system and is known as its 'attractor'. The 'strange attractor' of complexity is a set of values about which a system moves but never reaches, producing a pattern of endless variations. The human face can be understood as an example. Every face can be seen as a 'variation on a theme' while no fully determinate entity, 'a face', exists. At the same time, there are outside limits, albeit indeterminate, to the sphere of activity of an attractor and therefore limits to the system (Manson 2001). Any living organism has limits, inherent but not standardised. So, trees of a particular species grow to heights that are varied but within a limited range; trees have varied, but not randomly varied, life spans. It will be argued below that each performance of a practice can be understood as a variation on the theme of the practice itself, which, as a strange attractor, is never fully determinate.

Self-Organisation

Complex systems exhibit self-organisation, which is an elaboration of internal complexity due to the workings of the complex relations in the system over time. It results from the continuing adjustments and adaptations the system makes in managing its internal processes while adapting to its external environment.

Far-from-Equilibrium States

Complex systems exist, not on a linear continuum of disorder/order, but at 'far-from-equilibrium' states that 'hold' both stability and unpredictability. In far-from-equilibrium states, systems have the capacity, at what are variously known as bifurcations or phase changes, to become unstable leading to the breakdown of the current patterns of relations, an internal reorganisation of the system and the appearance of a *new* attractor, associated with *new* patterns of relations. This phenomenon is known as 'emergence'.

Emergence

Emergence is the appearance of 'radical novelty' (Goldstein 1999) or 'qualitative novelty' (Mikulecky 2001). It can be defined as 'the arising of novel and coherent structures, patterns or properties during the process of self-organisation in complex systems' (Goldstein 1999) or as 'the-coming-into-existence of new forms or properties through on-going processes intrinsic to the system itself' (Lewis 2000: 38). Emergent phenomena may be recognisable as 'offspring' of a system which itself may be complex. Examples are a new child in a family or the development of a sub-specialty of a profession. It may be expressed in terms of radical change within the 'parent' system. An example of this is an individual learning from experience being conceptualised as a qualitative change in a body/mind system in response to that experience. While emergent phenomena are characterised by qualitative novelty, this novelty is not something random because what is possible as emergence is constrained by the properties of the original system (its attractor). The emergent feature both preserves some 'likeness' and has 'irreducible difference' in relation to its parent system. So, every human can be understood as both an individual and as an expression of humanity.

Complexity and Relations

Complexity can be understood as 'what there is': the world with its myriad natural, biological and social relations with which we are in relation, in different ways that give different perspectives on the world and yield different forms of knowledge

(Cilliers 2002). Understood this way, the version of complexity that is commonly used in the social sciences is reductive, unnecessarily limiting what is conceptualised as knowledge. Current thinking about complexity has been shaped by the fields of mathematics and the natural sciences, where work is largely necessarily based in a reduced, Newtonian onto-epistemological framework. In particular, reduction is an essential aspect of research where causal relations are being sought. However, the mechanisms and the extent and significance of reduction underpinning these processes are commonly overlooked in the social sciences.

Relations as understood in the social sciences are already reduced in form, and complexity as it is usually understood is based on these reduced relations (Lancaster 2011). The reductive move is from complex real-world relations to the simpler linear relations of logic and Newtonian mechanics. These relations function much like entities themselves. Their value or meaning is fixed and inherent, does not depend on context and is unaffected by time, so they are unchanging over the duration of the process in which they are involved. Nor does engagement in linear relations alter the entities that are party to the relationship. For example, in '1 + 1', the '+' has a fixed meaning. Neither '1' is altered in its internal integrity, by the presence of '+' nor is '+' altered by either adjacent '1'. These are the kinds of relations between bricks in a wall (Hager 1996) or between a marble and a glass jar containing it (Garrison 2001).

John Dewey addressed the issue of reduction in relations in human functioning in 1949 in his late work with Arthur Bentley (Dewey and Bentley 1989). Dewey outlined an abstract formulation of the relations of living entities and of the relations that characterise differing degrees of relational reduction, experienced or made, in human processes. Dewey named the relations of Newtonian mechanics and logic, 'inter-actions'.[1] Their origin is methodological so their place lies in the 'convenience of study' (Dewey and Bentley 1989:103).

Dewey contrasted inter-actions with the living relations of organism-environment co-ordination: 'trans-actions'. He conceptualised the trans-actional process as being constituted by a distinction between organism and environment that is not an ontological given, waiting to be discovered, but the result of the human activity in the process of conceptualising human experience (Garrison 2001). Parties to trans-actional relations are understood as *functions* of a holistic co-ordination rather than as discrete *entities* brought pre-formed to the relation. They cannot be specified apart from the relation that they partially constitute. So, 'stimulus' has no meaning without 'response' and 'teaching' without 'learning' ('or not learning'). A dove has no status as 'prey' unless it is engaged with a hawk, in a predator-prey trans-action. Nor can each party be specified apart from the other, as each reciprocally 'co-creates' the other. Each is not known in a fixed way prior to the process of relationship; what they are must be 'discovered', as their significance or meaning unfolds as the process moves through time. As in all complex relations, in trans-actions, time is acknowledged and both the relation itself and the parties to the relation 'evolve' through the process (Dewey and Bentley 1989: 112–115).

Parties to trans-actional relations are of a functional, rather than a substance-based, equality. They are mutually dependent but are functionally asymmetrical, in that they cannot be substituted for each other. Each can be defined as 'not the other',

much like the yin/yang concept of Chinese philosophy. Another way of understanding this is that a trans-actional relation is a relation that holds within itself an internal distinction of a complementary but irreducible differentiation.

Complexity is commonly formulated in a reductive form, based on relations that, while non-linear, can be understood as having the original form of Deweyan interactions, so they are, in theory at least, amenable to algorithmic analysis. This conceptualisation fits within a substantialist onto-epistemological framework, and complexity conceptualised in this way can be thought of as a deterministic sub-set of complexity (Lancaster 2011). An example of complexity understood this way is that of a uniquely structured sand dune, produced from multiple grains of sand, being regarded as an emergent feature of the geographic system that produced it. But here, the relations between the grains of sand are, again, at least in theory, amenable to algorithmic analysis, and the grains themselves are not (significantly) changed in the dune formation process.

Basing inquiry in the social sciences on inter-actional relations is appropriate where the individuals who are party to the relations are conceptualised as research 'variables' or as generic 'agents', such as in the use of complexity for modelling purposes, like the modelling of traffic behaviour, of stock market fluctuations or of the spread of epidemics. But inquiry in the social sciences is limited by a lack of recognition of the initial relational reduction that underpins this form of complexity, because there can be no acknowledgement of the significance of what is lost by the reductive manoeuvre. Social inquiry, where the particular is relevant or where it is meaning rather than causal explanation that is sought, is impoverished by the use of this reductive framework.

If the basis of complexity is taken as complex relations, characterised by the presence of internal, irreducible distinctions, for which Dewey's trans-action can function as a two-party exemplar, then a complexity-based onto-epistemological framework that encompasses greater complexity becomes available for use (Lancaster 2011). One of the consequences of conceptualising complexity in this way, as 'general complexity', is that complex systems, particularly complex social systems, can be considered (Heylighen et al. 2005).

Complex Systems

The phenomenon of emergence gives rise to a generally agreed definition of complex systems: they are systems where emergent or 'macro level'[2] properties of the system cannot be explained in terms of parental or 'micro level' properties. For example, living organisms have, as their basic constituents, atoms and molecules on which life depends, but life is not a summing of such constituents; it is a phenomenon of a qualitatively different order. Positing that different levels in a complex system are characterised by irreducibly different internal relations means that the system as a whole cannot be meaningfully analysed in terms appropriate for just one such level of the system. The laws of physics and chemistry cannot be used to

understand living physiology; the rules that describe physiological functioning of the body/brain cannot be used to understand psychological functioning of the mind and psychological concepts cannot be used to describe or explain larger scale social phenomena such as organisational functioning. Thus, a complexity framework can be understood as one that encompasses irreducible distinctions without reduction to one or the other party to the distinction.

A complexity framework encompasses temporality. Each complex system has a history constrained by its original conditions and shaped by its responses to what it has undergone during its life. The system's history, its 'memory', is embodied in its current functioning (Cilliers 2006; Seidl 2007). This history functions as an internal limit of the system, both constraining and enabling. For example, an organisation that has been set up for a particular purpose, in particular circumstances, and has undergone particular events will have constraints on its range of possible future functioning.

A complexity framework encompasses limits in a way that a substantialist framework does not. From substantialist perspective, in theory at least, knowledge can be accumulated indefinitely and what we don't know now, can or will be known with further inquiry or increased computational power. However, complexity tells us that because everything cannot be connected to everything else, there are limits to functioning and limits to knowledge. Because they are constituted by complex relations, complex systems are incompressible, that is, no complete description of the system that is smaller than the system itself is possible. Any account of a complex system involves drawing a boundary, to distinguish what is to be considered the system and what is not. Such a selection process is contingent, so alternative possibilities, the significance of which *cannot be known*, have been left out; hence, descriptions of a system can never be complete and are always linked with the perspective from which they are made (Cilliers 2002, 2005).

Again, unlike a substantialist framework, a general complexity encompasses generativity or creativity, in the form of emergence. Emergence is problematic from a substantialist perspective because it is not amenable to algorithmic analysis. It is ostensive, that is, it can only be known when it appears (Goldstein 1999). It cannot be formulated or directed but it is not something random either.

Complex system boundaries are not spatial boundaries; they are a boundary function, formed by system relations (Cilliers 2005). Complex systems co-exist with each other in different ways. They relate on the basis of their own attractor function, that is, on their own terms. This is commonly an ecological relation where systems ignore or compete with other systems and, in turn, are impinged upon in a complementary way. However, living complex systems have a capacity for some 'interpenetration' of complexity, that is, aspects of their complex functioning may overlap or be shared. However, to maintain their own integrity and survive in this situation, they need to have control of their own functionality, including the functioning of their own boundaries. So in considering the functioning of living systems, an additional concept is useful, that of a complex system function of an internal open/closed distinction, known as operational closure or autopoiesis.

Living Complex Systems: Autopoiesis

While substantialist systems are conceptualised as either open or closed, in complex systems, there is flow of energy or material into and through the system, but at the same time, the system's structure is maintained. Biological systems need to be open to their environment in order to take in nutrients and excrete waste products but also need to maintain their integrity as a system. Biologists Humberto Maturana and Francis Varela described biological systems as managing this problem by being differentially open and closed: open for nutrition or sources of energy but closed in relation to *control* of their functioning, which is thus self-directed (Maturana and Varela 1980). This allows system processes, including the characteristic biological function of producing and re-producing of the system itself, from materials selectively imported from the external environment, but without being directed by information from external sources. Maturana coined the term 'autopoiesis' meaning 'self-creating' for such self-referential systems. A commonly used biological illustration of autopoiesis is that of the functioning of the organic cell, which imports what materials and energy it needs while the internal management of its functioning is wholly self-contained. Over its lifetime, the cell makes and remakes its own cellular components, including those that contain the information necessary for this process. It is this producing and re-producing of these components that *is* the central functioning of the cell as cells have no 'purpose' other than to live.

Whole biological organisms too autopoietically maintain their integrity as individual organisms. However, in particular circumstances, they are able to 'share' aspects of their individual functioning with each other. Such sharing occurs where two neurological systems, in close proximity over time, come, through social interaction, to share an alignment of certain neurological structures in the brain. This is known as 'structural coupling'. It is of crucial significance for human development, and it provides a platform for the human capacity of sharing aspects of bio-psychological functioning throughout life. Human psychological functioning is usually considered to be an aspect of the individual's private mind. However, work in disciplines such as neurobiology, child development and psychoanalysis suggests that aspects of bio-psychological functioning are shared. This sharing is a truly bio-psycho-social process, mediated by interpersonal relations between specific, rather than generic, individuals. It has both a biological-psychological outcome for the individual and a social outcome as it is central to the interpersonal relating from which human meaning emerges. It is this that makes it of central importance to an understanding of practice. As is argued through this chapter, practices are intelligible; as described by Schatzki, they are based on 'understandings' so the function of creating and re-creating meaning underlies practices.

The significance of what is shared in this process, affective functioning, will now be elaborated.

Human Complex Systems: Affective Functioning

For human survival, individuals need to be able to monitor and regulate internal psycho-physiological states, to engage with the external environment, including the social environment, and to manage the relationship between these inner and outer worlds. Managing these needs is a relational function of the body/mind: 'affective functioning', where raw experience, from inside and outside of the body is processed and given meaning from social sources. Affective functioning is a poorly delineated concept. It is a complex function, largely unconscious or tacit in nature, resisting linear exposition and representation in language. Recognisable emotions, such as anger, disgust or sadness, emerge from it, but it also encompasses the processing of a range of other relational and qualitative psycho-biological experiences, present from the beginnings of life. At this time, the developing mind is experienced as less differentiated from bodily states than it later comes to be, so affective experiences often have a somatic or bodily component. They include qualitative experiences such as that of 'newness', 'discordance' or 'recognition'. They are the experiential aspect of human relating to the world: 'empathy', 'intentionality', 'will' or 'desiring'. They can be observed in learnt human physical dexterity and skills and in the enjoyment of music, dance and poetry, where it is the 'emotional shape' of the activity, rather than any cognitive content, that carries meaning. For the individual, affective processing manages both the human need for engagement with the world and the results of that engagement. It provides the subjective experience of living: the basic ongoing sense of the self as a live agent, allowing us to survive in what would otherwise be an overwhelmingly complex and meaningless world. It is also, as elaborated on below, a function that is necessarily partially shared with others. This sharing with *specific* others is the process from which human meaning emerges, and hence it forms the basis of human practices.

The Origins of Shared Affective Functioning

Affective functioning has both input from the social world and a biological substrate; however, it is not solely contained within the biological individual. Immediately after birth, psychological functioning is relatively undeveloped. The infant needs an extended period of engagement with specific adults, commonly, primarily the mother, for the development of the capacity to regulate levels of arousal (alertness) and internal affective states. Here, in shared affective exchanges between mother and infant that are not conscious and that are mediated non-verbally through touch, gesture, facial expression, vocal tone and prosody, the mother processes the infant's experiences for them, so that internal, bodily and emotional experiences and external social experiences are integrated, becoming coherent and meaningful.

This mutual mother-infant functioning is a bio-psychological as well as a social process that is a consequence of the infant brain being 'wired' to allow structural shaping of its neurological development by affective engagement with other humans. Affective processing involves changes at a structural biological level, drawing some developing neural structures in the infant's brain into alignment with the same structures in the maternal brain, the mutual accommodation between the two neurological systems known as structural coupling. This integration of social experience and biology allows the storage of early experiences in the form of implicit memory and provides the infant with tacit, somatic- and affect-based working models of themselves, their body and their relations with the external world (Schore 2001). It is how we become human. It can be understood as the earliest form of human learning, and all later learning, from the development of language through to the complex abstract intellectual activity of the adult, is underpinned by this meaning-processing affective functioning.

The form of relating, where two or more minds function temporarily and partially as if they are one, by sharing affective functioning, is a human capacity that remains throughout life, albeit with less significance for survival than at the beginning of life. The individual uses it for support in the management of their internal affective states and in all interpersonal relating. 'Kept in mind' it forms the continuity of interpersonal relations, including in the absence of the other. It is both the source of grief at the loss of an affectively bonded other and the basis of empathy: the ability to identify with another. It underlies all social activity. It is the central function of the 'co-present' group, to be discussed below. Here, meaning is produced, providing the impetus for the social aspects of human activity, and in an ongoing way is interpreted, re-produced and re-attributed to human activities, modifying them. It is from the functioning of multiple, interrelating such groups that practices emerge and evolve.

Practice and the Co-present Group

The processing of affect is a primary function of human groups of two or more individuals, known as co-present groups. These are the familiar small groups that individuals engage with for the whole range of human activities; groups such as couples or families; friendship, social interest, ceremonial or work groups; and committees, working parties, task forces, teams, mentorships, therapy dyads, apprenticeships, classes, tutorials, supervision groups, clubs or community groups. They are based commonly on face to face or some other form of direct relating that extends over time, so that group interactions are constituted of more than an exchange of information, but, by including degrees of the non-verbal aspects of communication such as body language, facial expression and vocal intonation, come to facilitate the unconscious sharing of affect necessary for the processing of human experience in such groups. The central characteristic of co-present groups that facilitates this is that the individuals do not relate to each other as generic agents, but as *specific* individuals in complex trans-actional relations with each other, and hence are able to come to know each other 'affectively'. The working of complex or

trans-actional relations over time is the mechanism whereby group affective processing establishes and maintains the group, providing members with the feeling of being a group rather than a collection of individuals, even when group members are absent. It allows the group to function as a 'distributed mind' where individual functioning can be conceptualised as an aspect of the functioning of the group as a whole. Thus, an individual practitioner's performance can be understood as an instantiation or exemplar, one of a range of possible expressions of a particular practice.

Each co-present group can be understood as a complex system that emerges from the complex relations between the individuals of the group, while these individuals themselves function as complex systems, shaped by individual biology, personal social relations and historical experiences. If co-present groups are understood as living complex systems, each can be seen to have an affectively imbued attractor: the group's meaning or purposes. A group's attractor does not coincide exactly with the group's overt or stated purpose, such as, say, to solve an organisational problem or to learn some English grammar. The group's attractor, determined *by the group itself*, includes both the overtly understood purpose *and* the sharing and processing of affect, that is, of the wishes, interests, intentions, emotions and understandings of the group participants. Co-present group functioning is 'self-directed' in that it unfolds under the sway of the particular group's individual and ever varying attractor. This means that a co-present group cannot just follow external directions; it interprets these self-referentially according to its own needs. So, for example, in an English class, both how a teacher handles a particular piece of the curriculum and how students learn on that particular occasion will be shaped by the affective functioning of that particular class. Each class is an instantiation of a practice or practices (teaching English or classroom learning of grammar).

Sharing aspects of individual functioning in affective processing makes the co-present group a system of greater complexity, and therefore of greater creative functionality, than either the individual alone or other more reduced human systems such as whole organisations or bodies of theory. This is because the increase in complexity is based on increased complexity of relations, not on an increased summation of simple relations. Knowing group members as specific individuals necessarily limits co-present group size, but co-present groups have a greater complexity than a numerically greater crowd, where affective connections are relatively reduced, which is why crowd behaviour is often developmentally primitive in nature. They also have a greater complexity than a social institution or an organisation as a whole, because here a necessary reduction of complexity has already taken place in shaping the social structure's purposes, hence the need in organisations to set up internal co-present groups, such as working groups or committees, for addressing complex tasks (Lancaster 2011).

Co-present group functioning has two different forms of outcome, one usually conceptualised as social and the other as psychological. The first is the emergence, from the group's shared processing, of meaning, as determined and attributed by the group. Meaning, as a 'group understanding' may be fleeting and lost immediately or taken up, used and refined. Co-present groups interact as complex autopoietic systems with each other. Individuals move between co-present contexts, over time, so group complexity is shared in reduced form, formulated in language and given

new context-shaped complexity by its re-interpretation as it is used, adapted, passed on or ignored. Meaning may be produced in progressively reductive forms, to become opinion, theory, guidelines, rules or norms. These are generalisations where the situation or the individual is reduced to the generic, and useful where a reductive view is appropriate. They underpin the social concepts of equity in justice and in resource distribution. They are portable over distances and can be controlled, facilitating bureaucratic administration (Porter 2003). However, they also come with a loss of necessary complexity, so complexity is re-introduced in their use in every new performance. They may form part of a practice's attractor and may in turn, not direct, but constrain performances. Co-present group function, like that of an organic cell, can be constrained, or even killed off, but it cannot be directed. In some circumstances this is seen as a cost, as say, when bureaucracies want standardised teaching or medical treatment outcomes. However, the benefit is that co-present group function provides the greatest possible complexity available to us for managing our most complex problems.

The other outcome of co-present group functioning is that participation in the relations of the group changes the participating individuals, a change that can be conceptualised as learning. Such changes may remain unconscious or tacit and be seen as bodily capacities and skills only recognised in contexts where they are called on, or they may be experienced by the individual as an understanding of the meaning of some aspect of a particular practice. It is this learning that individuals take and contribute to new co-present groups. It is this learning that is expressed in the myriad individual performances that function as variations on the theme of a particular practice, itself ever evolving.

Conclusion

This chapter has elaborated an account of complexity based on complex rather than reduced relations. Complexity formulated this way comes with a cost of the recognition that knowledge is always limited. At the same time, it allows for a conceptualisation of living, human functioning in terms of systems that are both non-reductively linked and differentiated through phenomena such as emergence and shared autopoiesis. This allows complexity to be used as an onto-epistemological framework for formulations of human functionality such as that of Schatzki's account of practice (Schatzki 2001a, b).

Practices can be understood, as Schatzki suggests, as being central to human life. I have argued here that the creation and processing of meaning are both central to human life, underlying human practices, and that the co-present group is the site of this function. The 'shared practical understandings' that Schatzki places as central to practice can be seen to be created by, and emergent from, the multiple functional iterations of the linked co-present groups that constitute a field of practice. Such 'shared practical understandings' function as a context both for both 'mind' and for 'social orders' (Schatzki 2001a, b). Here, Schatzki is considering mind in relation to the individual's relational engagement with the world, which, as has been argued, is dependent on both access to shared meaning and participation in its production.

In reduced form, Schatzki's 'shared practical understandings', emergent from the co-present group, includes the attribution of meaning to social and material phenomena, both ultimately shaping 'social orders' and allowing material mediation of social meaning.

Endnotes

1. This chapter retains the hyphenated form that Dewey uses for these terms to indicate that his particular definition of the term 'transaction' is being used.
2. The terms micro and macro 'level' here refer only to the different 'parent' and 'offspring' functions of complex systems, not to any hierarchy of value, function or complexity.

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