THE EMERGENCE OF KNOWLEDGE IN ORGANIZATIONS

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This paper argues for a particular way of interpreting analogies from the complexity sciences as the basis for a perspective on knowledge creation in organizations called complex responsive processes of relating (Stacey, 2000; Stacey, Griffin & Shaw, 2001; Stacey, 2001). From this perspective, knowledge is continuously reproduced and potentially transformed processes of interaction between people. It follows that people cannot 'share' knowledge because one cannot share the actions of relating to others, only perform them. It also follows that knowledge as such is not stored anywhere. All that can be stored is reifications in the form of artifacts, or tools, which can only become knowledge when used in communicative interaction between people. It becomes impossible to talk about measuring knowledge as 'intellectual capital' because knowledge itself does not exist in measurable, or any other reified form. Indeed, putting the words 'intellectual' and 'capital' together makes little sense. The notion put forward by some (for example, Roos, Dragonetti & Edvinsson, 1997; Sveiby, 1997) that an organization can own 'intellectual capital', that is, can own the attitudes, competence and intellectual agility of individuals, becomes highly dubious since no one can own relationships. The conclusion is that while it is possible to nurture knowledge, it is impossible to 'manage' it, when 'manage' is understood in it conventional sense.

This paper first highlights the central concepts of mainstream thinking about knowledge creation and management in organizations and then outlines the perspective of complex responsive processes of relating.

Mainstream Thinking about Knowledge Creation in Organizations

Mainstream thinking is a term used in this paper to indicate the key concepts to be found in the most quoted writings on organizational learning and knowledge creation (Senge, 1990; Nonaka & Takeuchi, 1995). These writings in turn locate their theoretical frameworks in: systems dynamics (Forrester, 1961, 1969, 1971; Meadows, 1982); sender-receiver models of knowledge transmission from information theory (Shannon & Weaver, 1949); distinctions between tacit and explicit knowledge (Polanyi, 1958; 1960); notions of individual mental models, single and double loop learning (Bateson, 1973; Argyris & Schon, 1978; Argyris 1990); and dialogue as a special form of communication (Bohm, 1965; 1983). These concepts are to be found in most of the literature on knowledge management (for example, Burton-Jones, 1999; Davenport & Prusak, 1998; Kleiner & Roth, 1997; Leonard & Strauss, 1997; Sveiby, 1997; Quinn, Anderson & Finkelstein, 1996; Garvin, 1993; Brown, 1991.).

Throughout the above body of work, the individual and the collective, such as the group, the organization and society, are always treated as two distinct phenomenal levels requiring different explanations of how learning and knowledge creation takes place. The connection between the two levels is usually understood to lie in the interaction of individuals to create the level of group / organization, which then constitutes the context influencing how individuals interact. It is usually explicitly stated that it is individuals who learn and create knowledge, although this is almost always coupled with an emphasis on the importance of the teams within which this takes place. A key question then becomes whether a team, group or organization can be said to learn or whether it is just their individual members who do so. In mainstream thinking, in the end, it is usually individuals who learn and create

knowledge and the principal concern from an organizational perspective is how that individual learning and knowledge might be shared across an organization and how it might be captured, stored and retained by the organization. Sometimes, the group / social level is treated as a kind of transcendental group mind, common pool of meaning, or flow of a larger intelligence, for example, in Bohm's notion of dialogue.

Mainstream thinking assumes that individuals communicate by transmitting signals to each other and a distinction is usually drawn between transmissions of data, information, knowledge, insight and wisdom, all as the basis of action (for example, see Davenport & Prusak, 1998). As regards the transmission of knowledge, the distinction between explicit and tacit knowledge (Nonaka & Takeuchi, 1995) is thought to be particularly important. Explicit knowledge is systematic and easily transmitted from one person to another in the form of language. Tacit knowledge takes the form of mental models below the level of awareness and is displayed as skill or know-how. Mental models are representations of the world and the individual in that world, which are historically determined by the experience of the individual. New knowledge is said to come from tapping the tacit knowledge located in individual heads and this process of tapping is understood as one of translating the tacit knowledge in individual heads into explicit forms available to the organization. However, this process of translation does not explain how completely new tacit knowledge comes to arise in individual heads and for an approach claiming to explain the creation of knowledge, this is a major limitation. As knowledge is dispersed through an organization by the movement between tacit and explicit it must be tested and this requires discussion, dialogue and disagreement.

This is where it becomes important to work and learn in teams. The knowledge, information and data individuals transmit to each other, become shared routines, that is, they are stored in the form of culture, social structure, organizational procedures, traditions, habits and group norms. This constitutes a level above that of the individual, which forms the social context within which individuals live, act and relate to each other. In mainstream thinking, then, there is a circular, systemic interaction between individuals at one level and the group / organization / society at a higher level. The nature of this circular interaction is considered to be of central importance to the possibility of learning and knowledge creation. It is widely held that effective learning and knowledge creation requires widespread sharing of values to do with openness, trust, affirmation, dialogue and empowerment. Effectiveness of these processes is also said to require particular forms of leadership that establish values of this kind and provide a central vision to guide the learning and knowledge creation process.

Mainstream thinking is, therefore, firmly based in systems thinking and an understanding of mind drawn from cognitivist psychology, which holds mind to be a computing function of the brain (McCullough & Pitts, 1943; Gardner, 1885).

Over the past few years, developments in the natural complexity sciences (particularly Kauffman, 1995; Gel-Mann, 1994; Holland, 1998) have attracted the attention of some writers concerned with organizational knowledge. The tendency, however, is to regard the complexity sciences as an extension of systems thinking (for example, Nonaka & Takeuchi 1995; Boisot, 1998). It can be argued that this interpretation of the complexity sciences does not lead to any significant change in the underlying frame of reference described above (see Stacey, Griffin & Shaw, 2001). Consider now an alternative way of drawing on insights from the complexity sciences.

Analogies from the Complexity Sciences

Most systems theories envisage the systemic unfolding of that which is already enfolded, usually by a designer, in the definition or identification of the system itself. In other words, the system unfolds mature forms of an identity that is already there in some embryonic sense. This offers the prospect of control from outside the system, by a designer, and any transformation of the system's identity must also be determined from outside by a designer. However, at least some of those modeling complex adaptive systems (for example, Kauffman, 1995) are trying to simulate evolution as an internal dynamic that expresses identity and difference at the same time. When this process of evolution is modeled as a 'system' of interacting entities, that 'system' has a life of its own, rendering it much less susceptible to control from outside, if at all.

However, extreme care needs to be taken in using such modeling as a source domain for analogies with human action. The very act of modeling requires an external modeler and the specification of the model requires the initial design of a system, even though what is being modeled is an evolutionary process that is supposed not to depend upon any outside design. When one turns to this work as a source domain for human action, therefore, it is important to realize that *there is no analogy in human action for the external designer, programmer or model builder*.

Furthermore, if one takes the 'model' or the 'system' as the analogy for human interaction, one reifies human interaction and implies that one can stand outside of it and observe it. However, as a human, one can never stand outside of human interaction, since the very act of observing others interacting is itself an interaction. Systems thinkers have tried to deal with this problem by widening the boundary of the system to include the observer but in doing so always locate some kind of agency outside the boundary. For example, an observer including him / herself in the system is then observing him / herself observing. The argument leads to infinite regress (see Stacey, Griffin & Shaw, 2001). When one focuses attention on the 'system', one tends to lose sight of centrality of the process of interaction, which perpetually constructs itself as continuity and transformation. It follows, therefore, that *there is no analogy in human action for the 'system'*. Instead, *it is the process of interaction in the simulation that provides an analogy for human action* (Stacey, 2001). Although scientists who work with the concept of complex adaptive systems are clearly doing so within a systems framework, they are modeling processes that display the internal capacity to spontaneously produce coherence, as continuity and transformation, solely through local interaction in the absence of any blueprint or external designer. This work demonstrates the possibility that processes of interaction in local situations have the intrinsic capacity for patterning themselves as continuity and transformation at the same time. It is this insight that holds out the prospect of a different way of thinking about knowledge creation in organizations.

But, the modeling of abstract interactive processes cannot directly say anything about human acting and knowing. It requires imagination to avoid thinking about the abstract model from an external perspective as a system and think, instead, about what the modeling of interaction might be saying *from a perspective within that interaction*. It is for this reason that complexity theories cannot simply be applied to human action; they can only serve as a source domain for analogies with

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it. Furthermore, the models of complex adaptive systems are nothing more than abstract sets of relationships demonstrating possible properties of those relationships. The abstract relationships completely devoid of the attributes of any real processes and, therefore, their use as analogies requires imaginative acts of translation if they are to say anything about real processes. This paper suggests that *human interaction is analogous the abstract interaction modeled by complex adaptive systems*. The suggestion is that human relating intrinsically patterns living human experience as the coherence of continuity and transformation. This coherence is meaning, that is, knowledge emerging in the living present in local interactions without any global blueprint, plan or vision.

Modeling interaction in the medium of digital symbols

The action of complex adaptive systems is explored using computer simulations in which each agent is a computer program, that is, a set of interaction rules expressed as computer instructions. Since each instruction is a bit string, a sequence of symbols taking the form of 0s and 1s, it follows that an agent is a sequence of symbols, arranged in a particular pattern specifying a number of algorithms. These algorithms determine how the agent will interact with other agents, which are also arrangements of symbols. In other words, the model is simply a large number of symbol patterns arranged so that they interact with each other. It is this local interaction between symbols patterns that organizes the pattern of interaction itself since there is no set of instructions organizing the global pattern of interaction. The programmer specifies the initial symbol patterns, then the computer program is run, and the patterns of interaction are observed. Simulations of this kind demonstrate the possibility of symbolic interaction, in the medium of digital symbols arranged into algorithmic rules, patterning itself.

For example, in his Tierra simulation, Ray (1992) designed one bit string, one symbol pattern, consisting of eighty instructions specifying how the bit string was to copy itself. He introduced random mutation into the replication and limited computer time available for replicating as a selection criterion. In this way, he introduced chance, or instability, into the replicating process and imposed conditions that both enabled and constrained that process. This instability within constraints made it possible for the interaction to generate novel attractors. The first attractor was that of exponentially increasing numbers of individual symbol patterns, which eventually imposed a constraint on further replication. The global pattern was a move from sparse occupation of the computer memory to overcrowding. However, during this process, the individual symbol patterns were gradually changing through random bit flipping, so coming to differ from each other. Eventually, distinctively different kinds of symbol patterns emerged, namely, long ones and short ones. The constraints on computer time favored smaller ones so that the global pattern shifted from one of exponential increase, to one of stable numbers of long bit strings, to one of decline in long strings accompanied by an increase in short ones. The model spontaneously produced a new attractor, one that had not been programmed in. In other words, new forms of individual symbol patterns and new overall global patterns emerged at the same time for there can be no global pattern of increase and decline without simultaneous change in the length of individual bit strings and there can be no sustained change in individual bit string lengths without the overall pattern of

increase and decline. Individual symbol patterns, and the global pattern, are forming and being formed by each other, at the same time. To repeat, the new attractor is evident both at the level of the whole population and at the level of the individual bit strings themselves at the same time.

Furthermore, the new attractors are not designed but emerge as self-organization, where it is not individual agents that are organizing themselves but, rather, the pattern of interaction and it is doing so simultaneously at the level of the individuals and the population as a whole. It is problematic to separate them out as levels, since they are emerging simultaneously. No individual bit string can change in a coherent fashion on its own since random mutation in an isolated bit string would eventually lead to a completely random one. In interaction with other bit strings, however, advantageous mutations are selected and the others are weeded out. What is organizing itself, through interaction between symbol patterns, is then changes in the symbol patterns themselves. Patterns of interacting are turning back on themselves, imperfectly replicating themselves, to yield changes in those patterns of interaction.

Ray, the objective observer external to this system, then interpreted the changes in symbol patterns in his simulation in terms of biology, in particular, the evolution of life. Using the model as an analogy he argued that that life has evolved in a similar, self-organizing and emergent manner. Other simulations have been used to suggest that this kind of emerging new attractor occurs only at the edge of chaos where there is a paradoxical pattern of both stability and instability at the same time.

The computer simulations thus demonstrate the possibility of digital symbols self organizing, that is, interacting locally in the absence of a global blueprint, in the dynamics at the edge of chaos to produce emergent attractors of a novel kind, provided that the symbol patterns are richly connected and diverse enough. Natural scientists at the Santa Fe institute and elsewhere then use this demonstration of possibility in the medium of digital symbols as a source of analogy to provide explanations of phenomena in particular areas of interest such as biology. The interaction between patterns of digital symbols can also provide an abstract analogy for human interaction, if that interaction is understood from the perspective of Mead's thought on mind, self and society.

Mead's theory of the evolution of mind, self and society

For Mead (1934), human societies are not possible without human minds and human minds are not possible in the absence of human societies. Humans must cooperate to survive and they also have an intense, intrinsic need for relationship and attachment to others. Indeed the human brain seems to be importantly shaped by the experience of attachment (Schore, 1994, 1997). Mead therefore sought an explanation of how mind and society, that is cooperative interaction, evolved together.

He adopted a phenomenological, action-based account of how mind and society might have evolved from the interactive behavior of the higher mammals. He pointed to how dogs relate to each other in a responsive manner, with the act of one fitting into the act of the other, in aggressive or submissive interactions. One dog might make the gesture of a snarl and this might call forth a counter snarl on the part

of the other, which means a fight, or it might call forth a crouching movement, which means submission. In other words, the gesture of one animal calls forth a response from another and together gesture and response constitute a social act, which is meaning. This immediately focuses on interaction, that is, a rudimentary form of social behavior, and on knowing and knowledge as properties of interaction, or relationship. Meaning is not first arising in an individual and then expressed in action, nor is it transmitted from one individual to another. Rather, meaning emerges in the interaction between them. Meaning is not attached to an object, or stored, but repeatedly created in the interaction.

Mead described the gesture as a symbol in the sense that it is an action that points to a meaning. However, the meaning could not be located in the symbol taken on its own. The meaning only becomes apparent in the response to the gesture and therefore lies in the whole social act of gesture-response. The gesture, as symbol, points to how the meaning might emerge in the response. Here meaning is emerging in the action of the living present in which the immediate future (response) acts back on the past (gesture) to change its meaning. Meaning is not simply located in the past (gesture) or the future (response) but in the circular interaction between the two in the living present. In this way the present is not simply a point but has a time structure. Every gesture is a response to some previous gesture, which is a response to an even earlier one, thereby constructing history.

This process of gesture and response between biological entities in a physical context constitutes simple cooperative, social activity of a mindless, reflex kind. The 'conversation of gestures' is both enabling and constraining at the same time and it constitutes meaning, although animals acting in this meaningful way are not aware of the meaning. At this stage, meaning is implicit in the social act itself and those acting are unaware of that implicit meaning.

Mead argued that humans must have evolved from mammals with similar rudimentary social structures to those found in present day mammals. The mammal ancestors of humans evolved central nervous systems that enabled them to gesture to others in a manner that was capable of calling forth in themselves a range of responses similar to those called forth in those to whom they were gesturing. This would happen if, for example, the snarl of one called forth in itself the fleeting feelings associated with counter snarl and crouching posture, just as they did in the one to whom the gesture of snarl was being made. The gesture, as symbol, now has a substantially different role, namely, that of a significant symbol, which is one that calls forth a similar response in the gesturer as in the one to whom it is directed. Significant symbols, therefore, make it possible for the gesturer to 'know' what he or she is doing.

This simple idea is a profound insight. If, when one makes a gesture to another, one is able to experience in one's own body a similar response to that which the gesture provokes in another body, then one can 'know' what one is doing. It becomes possible to intuit something about the range of likely responses from the other. This ability to experience in the body something similar to that which another body experiences in response to a gesture becomes the basis of knowing and of consciousness. Mead suggested that the central nervous system, or better still the biologically evolved whole body, has the capacity to call forth in itself feelings that are similar to those experienced by other bodies. The body, with its nervous system, becomes central to understanding how animals 'know' anything.

The neuroscientist, Damasio (1994, 1999), argues that the human brain continuously monitors and integrates the rhythmical activity of the heart, lungs, gut, muscles and other organs, as well as the immune, visceral and other systems in the body. At each moment the brain is registering the internal state of the body and Damasio argues that these body states constitute feelings. This continuous monitoring activity, that is, registration of feeling states, is taking place as a person selectively perceives external objects, such as a face or an aroma, and experience then forms an association between the two. Every perception of an object outside the body is associated, through acting into the world, with particular body states, that is, patterns of feeling. When a person encounters situations similar to previous ones, he or she experiences similar feeling states, or body rhythms, which orient that person to act into the situation. In this way, human worlds become affect laden and the feeling states unconsciously narrow down the options to be considered in a situation. In other words, feelings unconsciously guide choice and when the capacity to feel is damaged so is the capacity to rapidly select sensible action options. Damasio suggests that, from a neurological standpoint, the body's monitoring of its own rhythmic patterns is both the ground for its construction of the world it acts into and its unique sense of subjectivity.

Possessing this capacity, the maker of a gesture can intuit, perhaps even predict, the consequences of that gesture. In other words, he or she can know what he or she is doing, just before the other responds. The whole social act, that is, meaning, can be experienced in advance of carrying out the whole act, opening up the possibility of reflection and choice in making a gesture. Furthermore, the one responding has the same opportunity for reflecting upon, and so choosing, from the range of responses. The first part of a gesture can be taken by the other, as an indication of how further parts of the gesture will unfold from the response. In this way, the two can indicate to each other how they might respond to each other in the continuous circle in which a gesture by one calls forth a response from another, which is itself a gesture back to the first. Obviously, this capacity makes more sophisticated forms of cooperation possible.

The capacity to call forth the same response in oneself as in the other is thus a rudimentary form of awareness, or consciousness, and together with meaning, it emerges in the social conversation of gestures. At the same time as the emergence of conscious meaning, there also emerges the potential for more sophisticated cooperation. Human social forms and human consciousness thus both emerge at the same time, each forming and being formed by the other at the same time, and there cannot be one without the other. As individuals interact with each other in this way, the possibility arises of a pause before making a gesture. In a kind of private role-play, emerging in the repeated experience of public interaction, one individual learns to take the attitude of the other, enabling a kind of trial run in advance of actually completing or even starting the gesture.

In this way, *rudimentary forms of thinking develop, taking the form of private role-playing*, that is, gestures made by a body to itself, calling forth responses in itself. Mead said that humans are fundamentally role-playing animals. He then argued that the gesture that is particularly useful in calling forth the same attitude in oneself as in the other is the vocal gesture. This is because we can hear the sounds we make in much the same way as others hear them, while we cannot see the facial gestures we make as others see them, for example. The development of more sophisticated patterns of vocal gesturing, that is, of the language form of significant

symbols, is thus of major importance in the development of consciousness and of sophisticated forms of society. Mind and society emerge together in the medium of language. However, since speaking and listening are actions of bodies, and since bodies are never without feelings, the medium of language is also always the medium of feelings. Furthermore, the public and private roles plays, or conversations, which constitute the experience of the interacting individuals, actually shape the patterns of connections in the plastic brains of each (Freeman, 1995). Both public and private conversations are shaping, while being shaped by the spatio-temporal patterns of brain and body. This simultaneous public and private conversation of gestures takes place in the medium of significant symbols, particularly those of language, and it is this capacity for symbolic mediation of cooperative activity that is one of the key features distinguishing humans from other animals.

As soon as one can take the attitude of the other, that is, as soon as one can communicate in significant symbols, there is at least a rudimentary form of consciousness. In other words, one can 'know' the potential consequences of one's actions. The nature of the social has thus shifted from mindless cooperation to mindful, role-playing interaction made more and more sophisticated by the use of language. Meaning is now particularly constituted in gesturing and responding in the medium of vocal symbols, that is, conversation. Mind, or consciousness, is the gesturing and responding action of a body directed towards itself as private role play and silent conversation, and society is the gesturing and responding actions of bodies directed towards each other. Conversational relating between people is the process in which meaning, that is, knowledge, perpetually emerges.

As more and more interactions are experienced with others, so increasingly, more roles and wider ranges of possible responses enter into the role-playing activity that is continuously intertwined with public gesturing and responding. In this way, the capacity to take the attitude of many others evolves and this becomes generalized. Each engaged in the conversation of gestures can now take the attitude of what Mead calls the generalized other. Eventually, individuals develop the capacity to take the attitude of the whole group, that is, the social attitude, as they gesture and respond. The result is much more sophisticated processes of cooperative interaction.

The next step in this evolutionary process is the linking of the attitude of specific and generalized others, even of the whole group, with a 'me'. In other words, there evolves a capacity to take the attitude of others not just towards one's gestures but also towards one's self. The 'me' is the configuration of the gestures / responses of the others / society to one as a subject, or an 'I'. What has evolved here is the capacity to be an object to oneself, a 'me', and this is the capacity to take the attitude of the group, not simply to one' gestures, but to one's self. A self, as the relationship between 'me' and 'I', has therefore emerged, as well as an awareness of that self, that is, self-consciousness. Mead argued that this 'I' response to the 'me' is not a given but is always potentially unpredictable in that there is no predetermined way in which the 'I' might respond to the 'me'. In other words, each of us may respond in many different ways to our perception of the views others have of us. Here, Mead is pointing to the importance of difference, or diversity, in the emergence of the new, that is, in the potential for transformation. In addition to Mead's argument, one could understand the response as simultaneously called forth by the gesture of the other and selected or enacted by the responder. In other words, the response of the 'I' is both being called forth by the other and being enacted, or selected by the history,

biological, individual and social, of the responder. Your gesture calls forth a response in me but only a response I am capable of making and that depends upon my history. This adds a constructivist dimension to Mead's argument, suggesting a paradoxical movement in the response of selection / enactment and evocation / provocation at the same time. In this way, the reproduction and potential transformation of historical responses in the living present is held in tension with the reproduction and potential transformation of evocation.

The social, in human terms, is a highly sophisticated process of cooperative interaction between people in the medium of symbols in order to undertake joint action. Such sophisticated interaction could not take place without self-conscious minds but neither could those self-conscious minds exist without that sophisticated form of cooperation. In other words there could be no private role play, including silent conversation, by a body with itself, if there was no public interaction of the same form. Mind / self and society are all logically equivalent processes of a conversational kind.

However, the symbolic processes of mind / self are always actions, experienced within a body as rhythmic variations, that is, feeling states. Mind is action of the body, rather like walking is the action of the body. One would not talk about walking emerging from the body and it is no more appropriate to talk about mind emerging from the brain. Note how the private role play, including the silent conversation of mind / self, is not stored as representations of a pre-given reality. It is rather, continuous spontaneous action in which patterns of action are continuously reproduced in repetitive forms as continuity, sameness and identity, and simultaneously as potential transformation of that identity. In other words, as with interaction between bodies, the social, so with interaction of a body with itself, mind, there is the experience of both familiar repetition of habit and the potential of spontaneous change. The process is not representing or storing but continuously reproducing and creating new meaningful experience. In this way, the fundamental importance of the individual self and identity is retained, along with the fundamental importance of the social. In this way too, both continuity and potential transformation are always simultaneously present. Furthermore, there is no question of individuals at one level and the social at another. They are both at the same ontological level.

The Connection with the Complexity Sciences

The process of interaction between people is a continuous circular one that takes place in the medium of embodied symbols, for example, in sounds called words. However, as one imagines such interaction between larger and larger numbers of individuals, one wonders how any kind of global coherence could arise in such huge numbers of local interactions. This is not an issue that Mead dealt with, but it is one where the complexity sciences offer important insights.

Some of the work in the complexity sciences explores the properties of abstract models of continuous circular processes of interaction between computer programs in the medium of digital symbols. It is possible that certain properties of interaction demonstrated in the abstract models might, therefore, offer analogies for human interaction, interpreted through Mead's thought. The modeling of complex interactions demonstrates the possibility that interactions between large numbers of entities, each entity responding to others on the basis of its own local organizing

principles, can produce coherent patterns with the potential for novelty in certain conditions, namely, the paradoxical dynamics at the edge of chaos. In other words, the very process of self-organizing interaction, when richly connected enough, has the inherent capacity to spontaneously produce coherent pattern in itself, without any blueprint or program. Furthermore, when the interacting entities are different enough from each other, that capacity is one of spontaneously producing novel patterns in itself. In other words, abstract interactions can pattern themselves where those patterns have the paradoxical feature of continuity and novelty, identity and difference, at the same time.

By analogy, the circular process of gesturing and responding between people who are different to one another can be thought of as self-organizing relating in the medium of symbols having intrinsic patterning capacity. In other words, patterns of relating in local situations in the living present can produce emergent global pattern in the absence of any global blueprint. And emergent patterns can constitute both continuity and novelty, both identity and difference at the same time. This is what is meant by complex responsive process of relating and it amounts to a particular causal framework, where the process is one of perpetual construction of the future as both continuity and potential transformation at the same time. Individual mind and social relating are patterning processes in bodily communicative interaction forming and being formed by themselves.

The complex responsive process of relating perspective, then, is one in which the individual, the group, the organization and the society are all the same kinds of phenomena, at the same ontological level. The individual mind / self is an interactive role-playing process conducted privately and silently in the medium of symbols by a body with itself and the group, organization and society are all also interactive processes in the medium of the same symbols, this time publicly and often vocally between different bodies. The individual and the social, in this scheme, simply refer to the degree of detail in which the whole process is being examined. They are fractal processes.

Culture and social structure are usually thought of as repetitive and enduring values, beliefs, traditions, habits, routines and procedures. From a complex responsive process perspective, these are all social acts of a particular kind. They are couplings of gesture and response of a predictable, highly repetitive kind. They do not exist in any meaningful way in a store anywhere but, rather, they are continually reproduced in the interaction between people. However, even habits are rarely exactly the same. They may often vary as those with whom one interacts change and as the context of that interaction changes. In other words, there will usually be some spontaneous variation in the repetitive reproduction of patterns called habits. These habits and routines, values and beliefs are not at some higher ontological level. They are part of the pattern of interaction between people. Furthermore, there is no requirement here of any sharing of mental contents, or any requirement that people should be engaging in the same private role plays. The only requirement for the social understood as habits, routines and so on, is that people should be acting them out.

Systems, databases, recorded and written artifacts are usually thought of as a stores of knowledge. From the complex responsive process perspective they are simply records that can only become knowledge when people use them as tools in their processes of gesturing and responding to each other. What is captured in these artifacts is inevitably something about the meanings of social acts already

performed. Since a social act is ephemeral and since knowledge is social acts, it can never be stored or captured. Habits here are understood not as shared mental contents but as history-based, repetitive actions, both private and public, reproduced in the living present with relatively little variation.

Conclusion

There are profound implications of this way of thinking for how one understands learning and knowledge creation in organizations. From mainstream perspectives, knowledge is thought to be stored in individual heads, largely in tacit form, and it can only become the asset of an organization when it is extracted from those individual heads and stored in some artifact as explicit knowledge. From a complex responsive process perspective, knowledge is always a process of responsive relating, which cannot be located simply in an individual head then to be extracted and shared as an organizational asset. Knowledge is the act of conversing and new knowledge is created when ways of talking, and therefore patterns of relationship, change. Knowledge, in this sense, cannot be stored and attempts to store it in artifacts of some kind will capture only its more trivial aspects. The knowledge assets of an organization then lie in the pattern of relationships between its members and it is destroyed when those relational patterns are destroyed. Knowledge is, therefore, the thematic patterns organizing the experience of being together. It is meaningless to ask how tacit knowledge is transformed into explicit knowledge since unconscious and conscious themes organizing experience are inseparable aspects of the same process. Organizational change, learning and knowledge creation are the same as change in communicative interaction, whether people are conscious of it or not. This perspective suggests that the conversational life of people in an organization is of primary importance in the creation of knowledge.

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