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Sociocybernetics and autopoiesis – new laws of organisational form?

ABSTRACT

Contemporary debates in social disciplines are making increasing reference to theoretical concepts such as *sociocybernetics* and *autopoiesis* (Bailey, 1983, 1997, 2001; Bopry, 2007, Brier, 2005; Geyer, 1994, 1995, 2003; Glanville, 2004; Goldspink, 2001; Hernes & Bakken, 2003; Krippendorff, 1996; Letiche, 2007; Luhmann, 1996; Mingers, 2002b; Morgan, 1998; Scott, 1996, 2001b, 2003; Smith & Higgins, 2003; Umpleby, 2005; Van der Zouwen, 1997; Von Foerster, 2003; Von Glasersfeld, 1996). It becomes apparent from these debates that certain paradigm shifts are imminent not so much as a result of new knowledge, but rather as a result of new metaphors that present alternative perspectives for interdisciplinary corroboration.

Thus far, debates on revisiting cybernetic concepts have largely been conducted in other social sciences disciplines such as sociology, politics and semiology, this despite the challenges a co-creational perspective poses for communication in general and for organisational communication specifically. This paper aims to raise the debate amongst communication scholars, especially since communication scholars are conspicuously absent in the social-scientific debates within other disciplines, and we are in danger of failing to challenge our own intellectual assumptions. As such, this paper discusses and explores the appropriateness and applicability of cybernetics and autopoiesis as contemporary theoretical approaches to the study of organisations as communicatively enacted entities. It attempts to identify some of the intellectual challenges posed by extending the boundaries of our conversations beyond our recognised metaphors and concepts.

The purpose of this paper is to initiate dialogue among communication scholars that may resonate with the constructivist epistemology, and which constitutes both cybernetics and postmodernism. We argue that cybernetics in its entirety poses a challenge for the study of organisations from a communication perspective. We argue, as Geyer (1995) has done, that it may be an intellectually challenging exercise to reposition the current modern and postmodern organisational metaphors within a single new emerging metaphor: the schismatic metaphor.

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INTRODUCTION

Contemporary debates in social disciplines are making increasing reference to theoretical concepts such as *sociocybernetics* and *autopoiesis* (Bailey, 1983, 1997, 2001; Bopry, 2007; Brier, 2005; Geyer, 1994, 1995, 2003; Glanville, 2004; Goldspink, 2001; Hernes & Bakken, 2003; Krippendorff, 1996; Letiche, 2007; Luhmann, 1996; Mingers, 2002b; Morgan, 1998; Scott, 1996, 2001b, 2003; Smith & Higgins, 2003; Umpleby, 2005; Van der Zouwen, 1997; Von Foerster, 2003; Von Glasersfeld, 1996). Along with these concepts, more familiar ones, such as *first-order cybernetics*, *complexity theory*, *second-order cybernetics*, *third-order cybernetics* and *cybersemiotics*, are also appearing in these debates. It becomes apparent from these debates that certain paradigm shifts are immanent – not so much as a result of new knowledge, but rather as a result of new metaphors that present alternative perspectives for interdisciplinary corroboration.

Thus far, debates on revisiting cybernetic concepts have largely been conducted in other social sciences disciplines such as sociology, despite the challenges a co-creational perspective poses for communication in general and for organisational communication specifically. This paper aims to raise the debate amongst communication scholars, especially since communication scholars are conspicuously absent in the social-scientific debates within other disciplines, and we are in danger of failing to challenge our own intellectual assumptions. As such, this paper discusses and explores the appropriateness and applicability of cybernetics and autopoiesis as contemporary theoretical approaches to the study of organisations as communicatively constituted entities. It attempts to identify some of the intellectual challenges posed by extending the boundaries of our conversations beyond our recognised metaphors and concepts.

A sensible point of departure for this paper is the definition and description of sociocybernetics and autopoiesis as key concepts. Geyer (1995), among others, links *Sociocybernetics* – which emerged in the late 1990s – to Walter Buckley's seminal publication *Society as a complex adaptive system* (1968)., by Buckley has been identified as one of the founders of sociocybernetics (Umpleby, 2005).

The term *autopoiesis* can be understood as the principle of a self-producing or self-constructing social multiverse rather than universe. In terms of its application in the study of organisations, Letiche (2007: 187) applies this assertion to organisations: "Organizations organize organization. What is the product of organizing? – Organization. What do organizations do? – they organize. Thus organizing and organization form a closed system." Whereas circular reasoning has been considered fallacious in the past, the understanding of recursivity and self-reference within the autopoietic metaphor explains that 'organisation' as a noun, and 'organising' as a verb create a self-referencing pair – each refers to the other and exists in terms of the other recursively (Letiche, 2007: 187).

Mingers's description (2002a: 304) of autopoiesis as "... a complex and sophisticated theory that also explains the biological basis of cognition, self-consciousness, language and human behaviour" already presents a complex picture that was further enhanced when Niklas Luhmann's

controversial publications on social autopoiesis entered the social-scientific conversations. Umpleby (2005: 4) says that Luhmann's ideas on social autopoiesis were introduced to Europe in 1995, which was when Luhmann's *Soziale Systeme: Grundriß einer allgemeinen Theorie* (1984) was translated from German. Autopoiesis co-evolved with cybernetics since Maturana and Varela's publication of *Autopoiesis and cognition. The realization of the living* (1972), translated as a compilation of work between Maturana and Varela respectively between 1928 and 1972, while the term *cybernetics* was developed during the Macy Conferences that commenced in the late 1940s (Umpleby, 2005). Autopoiesis was immediately incorporated within a second-order cybernetic frame of reference as the emphasis shifted towards the observing rather than the observed system and the revision of existing metaphors, with particular reference to organisational metaphors. The concepts *organising*, *self-organising* and *organisation* constitute the permeable boundaries of this conversation.

Morgan (1998) identifies seven organisational metaphors that generally represent existing organisation studies: machines, organisms, brains, cultures, political systems, psychic prisons, or instruments of domination. The first two of these are more generally encountered. General systems theory has been represented in both mechanistic and organismic metaphors that distinguish the properties and processes in living systems, such as human individuals, and also in the machines and closed systems created by individuals. General system properties, processes, and characteristics, such as wholeness, interdependence, system hierarchy, equifinality, requisite variety, negative entropy, and so forth have also been employed. Individual and social systems have been studied as essentially open systems receiving inputs and producing outputs that result from the processing that occurs in the 'black box'.

Sociocybernetics, as a theoretical framework for the application of essentially natural-scientific concepts to social phenomena, together with autopoiesis as a theory of biology and cognition within the boundaries of second-order cybernetics, suggests that a revision of these concepts and an assessment of their potential for integration within communication theory development should be explored further. A review of cybernetics as a metadiscipline could shed some light on these different concepts. Geyer (1995: 6) introduces the challenges of sociocybernetics by stating:

> Over the last few decades, cybernetics and the social sciences have started influencing one another, although still to a limited extent. We therefore cannot and do not claim that cybernetics as a whole forms a challenge to sociology as a whole, but do argue that it would be an intellectually stimulating and profitable experience for many sociologists to get acquainted with some of the more recent developments in cybernetics.

The purpose of this paper is to initiate dialogue among communication scholars that may resonate with the constructivist epistemology, which constitutes both cybernetics and postmodernism. We shall argue that cybernetics as a whole poses a challenge for the study of organisations from a communication perspective. We argue, as Geyer (1995) has done, that it may be an intellectually challenging exercise to reposition the current modern and postmodern organisational metaphors within a single new emerging metaphor: the schismatic metaphor, which we shall further define and describe in the next section.

An overview of the general conceptualisations within these fields appears to be a sensible point of departure.

1. CYBERNETIC METAPHORS

A closer look at some of the existing organisational metaphors associated with cybernetic concepts illuminates some general perceptions and applications of first-order cybernetics, complexity, second-order cybernetics, third-order cybernetics, and cybersemiotics within organisational studies.

1.1 First-order cybernetics

Wiener (1948) uses the term *cybernetics* to refer to the study of control in the animal and the machine, which immediately gives it a mechanistic dimension. First-order cybernetics, or simply *cybernetics*, as it was first known, was initially considered to relate to the study of closed systems, circular causality, entropy (translated as 'uncertainty'), equilibrium, positive and negative feedback loops, resonance – and is generally represented in natural-scientific vocabulary such as mathematics and physics. Cybernetics has a rich genealogy and the cybernetic tradition has been described as the origin of modern communication theory (Craig, 1999: 121).

The attempts of scientists to create a unified scientific community commenced in the late 1940s with the Macy Conferences on circular, causal and feedback mechanisms in biological and social systems (Umpleby, 2005; Von Foerster, 2003). Norbert Wiener, an American mathematician, coined the term *cybernetics* in his book *Cybernetics: or control and communication in the animal and the machine* (1948). This was followed by his publication of *The human use of human beings. Cybernetics and society* (1950), in which he states:

> In giving the definition of Cybernetics [in the original book], I classed communication and control together. Why did I do this? When I communicate with another person, I impart a message to him, and when he communicates back with me he returns a related message which contains information primarily accessible to him and not to me.

The emphasis on 'control' was immediately apparent in the origin of the term cybernetics from its Greek meaning 'steersman' (Bailey, 2001; Geyer, 1995). Wiener (1950: 16-17) explains the relationship between control and communication as follows:

> When I control the actions of another person, I communicate a message to him, and although this message is in the imperative mood, the technique of communication does not differ from that of a message of fact. ... Thus the theory of control in engineering, whether human or animal or mechanical, is a chapter in the theory of messages.

When first-order cybernetics is applied to the study of individuals, the understanding of 'control' gains added dimensions and therefore requires further clarification. Early applications

of control in the study of systems have been witnessed in Parsons's structural functionalism, for example, with specific reference to a social or organisational level of analysis. However, when the individual is studied as a controlling entity who exhibits controlling characteristics on various and different individual levels (such as self-control), first-order cybernetics offers the analytical tools for a more microscopic level of analysis, as this article aims to show. In his book *Behaviour: the control of perception* (1973), Powers developed perceptual control theory (PCT), in which he states: "A hierarchical structure of neurological control systems is proposed that is at least potentially identifiable and testable, in which each control system specifies the behaviour of lower level systems and thus controls its own perceptions." Brown (1966: 319) identifies 'control' as a general systems characteristic: "This centers on the prevention and correction of deviations in a system's behaviour from those standards which are specified at a given time." Although such control may be exerted in different ways within different types of systems, it can therefore be assumed to be immanent in all systems. Discrepancies have been observed in the application of cybernetics to social studies, but Scott (2001a: 412) states:

> The power of cybernetics as a transdiscipline is that it abstracts, from the many domains it adumbrates, models of great generality. Such models serve several purposes: they bring order to the complex relations between disciplines; they provide useful tools for ordering the complexity within disciplines; they provide a 'lingua franca' for interdisciplinary communication; they may also serve as powerful pedagogic and cultural tools for the transmission of key insights and understandings to succeeding generations.

Systems of all kinds, such as ecosystems, mechanical systems, living systems, social systems, and so forth, all co-exist and co-create, and can therefore not be studied successfully in isolation from each other. To some extent, every system affects every other system. While it is understandable that the application of, for example, the first and second laws of thermodynamics and increased entropy in closed systems appeared mechanistic and foreign to the study of individuals and social systems, it will become clear in this article that these laws actually do apply to the individual as an operationally closed, informationally open suprasystem. Ashby (1956: 1) had a similar view: "Cybernetics started by being closely associated with physics, but it depends in no essential way on the laws of physics or the properties of matter. Cybernetics deals with all forms of behaviour in so far as they are regular, or determinate, or reproducible." Developments within complexity theories made further significant contributions to current applications within cybernetics, and particularly second-order cybernetics, as this article aims to show.

1.2 Complexity theory

Complexity theory can be represented in several metaphors, and has its roots in physical science and its genesis in cybernetics by virtue of its epistemology of simulation. Morgan's holographic brain metaphor generates images of high complexity as Morgan (1998: 92-93)

associates it with terms such as *corporate DNA* and *networked intelligence*. While complexity theory developed in studies related to weather conditions, when the Lorenz attractor and chaos theory were identified, together with Ilye Prigogine's studies of thermodynamics and dissipative structures, the understanding of complexity was already immanent in first-order cybernetics and general systems theory. McCulloch (1965: 146) provides the evidence in support of this claim when he explains complexity within first-order cybernetics as follows:

> The transmission of signals over ordinary networks of communication always follows the law that deduction obeys, that there can be no more information in the output than there is in the input. The noise, and only the noise, can increase. Therefore, if we are to deal with knowers that are computing machines, we can state this much about them. Each is a device, however complicated, which can only corrupt revelation. In order to preserve a correct sense of proportion, let me be technical for a moment. The human eye has about one hundred million photoreceptors, whereas it has but one million relays to carry that information to the brain. The whole body contributes another million channels. Thus we may figure approximately three million relays putting information into the nervous system simultaneously. ... Thus the over-all reduction in information from input to output of brain is a million to one if we neglect the eyes proper, and a hundred million to one if we include them. What becomes of all that information? ... let us be perfectly frank to admit that causality is superstition.

Von Foerster (2003: 21) enhances this understanding of complexity with the following explanation:

> Ten neurons can be interconnected in precisely 1,267,650,500,228,229,401,703,205,376 different ways. This count excludes the various ways in which each particular neuron may react to its afferent stimuli. Considering this fact, it will be appreciated that today we do not yet possess a general theory of neural nets of even modest complexity.

This inability to identify and/or analyse the relationships between and among an almost infinite number of variables within many kinds of systems on many different levels, operating simultaneously, makes it obvious that any discussion of complexity theory will necessarily be complicated, as complexity theories are in themselves complicated. Nowotny (2005: 15) confirms the confusion that often accompanies encounters with complexity theories by stating:

> Complexity [here] conveys the sense of going beyond what mathematicians can handle and, hence, understand. In everyday life the notion of being unable to process all the relevant information, to observe and to know what is going on, enters also very quickly. Complexity points to something which is just beyond our ability to understand and control, yet presume it is densely packed, ordered and structured in some way that we fail to comprehend as yet.

Urry (2005: 3) describes the confusion that initially confronts the communication researcher when he or she engages with complexity theories, so often described in the language of physics, mathematics, chemistry, thermodynamics and biology:

> Complex systems analyses investigate the very many systems that have the ability to adapt and co-evolve as they organize through time. Such complex social interactions are likened to walking through a maze whose walls rearrange themselves as one walks through; new footsteps have to be taken in order to adjust to the walls of the maze that are adapting to each movement made through the maze. Complexity investigates emergent, dynamic and self-organizing systems that interact in ways that heavily influence the probabilities of later events. Systems are irreducible to elementary laws or simple processes.

It is evident that the study of intangible systems, such as those that drive the unconscious and conscious biological and mental processes within the individual – sometimes referred to as 'the black box' – cannot be realised through observation in itself. In this regard Krippendorff (1996: 316) states, "Considering the richness of the human senses and the fact that the human brain has about 11 billion unobserved neurons that either fire or rest, understanding humans by observation alone is a hopeless undertaking." When the emphasis is placed on the individual as unit of analysis, Capra's (2005: 33) observation that "complexity theory now offers the exciting possibility of developing a unified view of life's biological, cognitive and social dimensions" obtains added significance in that it corresponds well to the second-order cybernetic premises of self-creating systems.

1.3 Second-order cybernetics

According to Geyer (1995: 12), the clear articulation of second-order cybernetics occurred only in 1970 when Von Foerster coined the term in his distinction between first-order cybernetics as the cybernetics of observed systems and second-order cybernetics as the cybernetics of observing systems. Aguado (2009: 59) claims that one of the milestones of second-order cybernetics is the distinction between two coexisting epistemological traditions in Western thought, which are:

> ... on the one side, the tradition that radically separates scientific knowledge from general knowledge via the incommensurability of the subject and the object of knowledge and, on the other side, the tradition that correlates scientific knowledge to general – and, hence, to ordinary pragmatic – knowledge in terms of a complementary emergence of subject and object interaction.

Geyer (1995: 12) provides further clarification when he shows that the explicit inclusion of the observer in the system(s) studied from a second-order cybernetics perspective clearly places the emphasis on the study of living systems, while illuminating the biological basis of this approach. Umpleby (1994: 2) demonstrates, however, that the roots of second-order cybernetics were already present when the field of cybernetics was founded in the 1940s. He

argues that second-order cybernetics have since led to important theoretical understandings that have been of particular interest to studies relating to the nature of knowledge, cognition and understanding per se, as he states: "The 'second order cyberneticians' claimed that knowledge is a biological phenomenon (Maturana, 1970), that each individual constructs his or her own 'reality' (Von Foerster, 1973) and that knowledge 'fits' but does not 'match' the world of experience (Von Glasersfeld, 1987)" (Umpleby, 1994: 2). Geyer (1995: 12) shows, in reference to Umpleby, that the emphasis on living systems in second-order cybernetics has the following important consequences (for the study of social systems):

- All living systems have a will of their own, and do not only self-produce, but also produce their own parts or subsystems, generally utilising elements from their environment(s), such as the use of energy referred to in the discussion of dissipative structures. This means that living systems are thus organisationally closed, but informationally open.
- The result of this is that living systems are more difficult to steer or control and that their interactions with their environments (which they also create to a certain extent) are almost impossible to predict more than "a few moves ahead". It is therefore held that second-order cybernetics is more realistic about the possibilities of steering, and concentrates instead on understanding the evolution of biological and social complexity rather than on controlling it.
- Second-order cybernetics can therefore also be distinguished from first-order cybernetics by its interest in morphogenesis and positive feedback loops, rather than on homeostasis and negative feedback loops.

As the focus now shifts to Maturana and Varela's work on the biology of cognition, and to Von Foerster's discussions on the construction of reality from this perspective, it is considered relevant and appropriate to clarify the application and meaning of 'cognition' within second-order cybernetics. In reference to 'control' and 'steering' as it has been developed within first-order cybernetics, and related to Geyer's observation above, it is stated here that the 'living system' (with reference to the individual human being), as a composite unity of biological and cognitive systems, is very much a controlling entity. In other words, while it may be difficult for individuals to steer or control other individuals, the individual (as a self-creating system) is at all times engaged in controlling herself or himself to a certain degree, whether consciously or unconsciously. Therefore, the emphasis on the observer, who cannot be separated from her or his observations, implies that any study of individual behaviour must necessarily consider the self-creating, self-organising, self-steering activities that drive individual behaviour. Further, as operationally closed systems, individuals are self-controlling systems. Therefore, the significance of first-order cybernetics in the study of second-order cybernetics is abundantly clear. The argument to be made here is that the control mechanisms within the individual as an autopoietic (self-creating) system become apparent only through the understanding of communication as it has been articulated and applied within first-order cybernetics. Morgan's use of 'mechanistic' metaphors – where the emphasis was placed on structure, function, circularity and so forth – which led to theorising about bureaucracy (as

by Weber, for example), had certain social applications from a macro perspective. However, when the individual becomes the unit of analysis (from a micro perspective), these concepts acquire a different meaning, insofar as 'control' and 'steering' of the individual herself or himself is the subject under investigation. Varela, Maturana and Uribe (1974: 187) argue (in their discussion of living systems) that the overemphasis on isolated components has diverted the focus from the organisation that makes a living system a whole autonomous unity: "As a result, processes that are history dependent (individual organization) have been confused in the attempt to provide a single mechanistic explanation for phenomena which, although related, are fundamentally distinct." As earlier deliberated in the discussion of complexity, the study of the individual as a composite unity of self-creating systems necessarily involves the study of complex systems. In this regard Varela, Maturana and Uribe (1974: 187-188) state:

> Every unity can be treated either as an unanalyzable whole endowed with constitutive properties which define it as a unity, or else as a complex system that is realized as a unity through its components and their mutual relations. If the latter is the Complex Adaptive System, a complex system is defined as a unity by the relations between its components which realize the system as a whole, and its properties as a unity are determined by the way this unity is defined, and not by the particular properties of its components. It is these relations which define a complex system as a unity and constitute its organization.

In other words, the study of the individual and thus of individual behaviour and actions becomes the study of the relations and interchanges between the complex subsystems that realise the individual as a composite unity of biological and mental self-creating systems. With the understanding that the individual is a composite unity of biological and cognitive systems, and further, that these systems exist both on different levels of complexity and on different levels of consciousness, it is clear that the term *multiplexity* is more apt. It is also reiterated that even though this discussion about second-order cybernetics and autopoietics focuses specifically on cognitive, psychic and social systems, the impact of biological systems cannot be disregarded.

Luhmann (1995: 59) describes *psychic systems* as "constituted on the basis of a unified (self-referential) nexus of conscious states", and *social systems* as "constituted on the basis of a unified (self-referential) nexus of communications. While he excludes all other systems in his application of social autopoiesis, the understanding of cognitive systems is of fundamental importance for the purposes of this paper. Whereas Luhmann clearly articulates 'conscious states' in his description of psychic systems, it is clear, however, in studies of biology and cognition that unconscious processes and interactions drive individuals' behaviour.

Maturana and Varela (1980: 7) argue that "[C]ognition is a biological phenomenon and can only be understood as such; any epistemological insight into the domain of knowledge requires this understanding". They support this claim by stating that "[T]he observer is a human being, that is a living system, and whatever applies to living systems apply [sic] also

to him". Therefore, "the cognitive domain is *the entire domain of interactions* of the organism" (Maturana & Varela, 1980: 38 – emphasis added). The distinction between human individuals and other living systems is that human individuals can observe and describe themselves in a recursive manner. Maturana and Varela (1980: 41) explain that, through such self-description, "the organism becomes a self-observing system that generates the domain of self-consciousness as a domain of self-observation". Herein lies the clear distinction between the focus in second-order cybernetics (as introduced by Von Foerster) and autopoiesis (as presented by Maturana and Varela), as Maturana and Varela (1980: 41) state: "Self-consciousness then is not a neurophysiological phenomenon, it is a consensual phenomenon emerging in an independent domain of interactions from self-orienting behaviour and lies entirely in the linguistic domain." They add, however, that the independence of this domain of interactions is not complete, because on the one hand

> ... the anatomical and neurophysiological organization of the brain, by determining the actual possibilities of confluence of different states of activity in it, specifies both the domain of possible interactions of the organism with relations and the complexity of the patterns of orienting interactions that it can distinguish, and on the other hand because of the necessary subservience of the linguistic domain to the basic circularity of the organism through the generation of modes of behavior that directly or indirectly satisfy it limits the type of conduct that the organism can have without an immediate or eventual disintegration ...

The problem with such interdependence between physiological or biological systems for the study of individual behaviour lies in the inability of human individuals to observe the physical, chemical and living processes. As Luhmann (1995: 40) states, "[T]he living system is inaccessible to the psychic system; it must itch, hurt, or in some or other way attract attention in order to stir another level of system formation – the consciousness of the psychic system – into operation". Hernes and Bakken (2003: 1514) maintain that while the communication between systems cannot be observed directly, it presents itself in the form of actions. However, as was shown earlier, by definition the infinite number of possible interactions among various biological, cognitive, psychic and social systems means that the actions of individuals cannot be accounted for. Yet, with some understanding of the principles of complex adaptive systems, chaotic systems, and dissipative structures – together with the understanding of cognitive development and the formation of cognitive subsystems – it has to be acknowledged that any claims relating to individuals' behaviour have to consider that there will always be indeterminable variables that have different degrees of impact on different levels of analysis. Table 1 (page 11) highlights some of the key differences between first- and second-order cybernetics.

Table 1: Definitions of first- and second-order cybernetics (Umpleby, 2005)

Author	First-order cybernetics	Second-order cybernetics
Von Foerster	The cybernetics of observed systems	The cybernetics of observing systems
Pask	The purpose of a model	The purpose of a modeller
Varela	Controlled systems	Autonomous
Umpleby	Interaction among variables in a system	Interaction between observer and observed
Umpleby	Theories of social systems	Theories of the interaction between ideas and society

1.4 Third-order cybernetics

References to third-order cybernetics have appeared for a number of years, although its theoretical grounding and application have not been explicated. Mingers (1997), Boje and Arkoubi (2005), and Bailey (2007) introduce the concept of *third-order cybernetics* by reconceptualising Boulding's hierarchy of complexity for different purposes but with corresponding orientations. The understanding gained from second-order cybernetics is that the external observer can observe the system observing itself: the cybernetics of cybernetics, as Von Foerster (2003) explains. Bailey (2007: 22) identifies the need for the extension of sociocybernetic analysis to third-order cybernetics, and argues that "[T]hird-order sociocybernetics entails using a second external observer to observe the first external observer in the process of observing the system observing itself". In brief, third-order cybernetics focuses on the encoding processes and "reveals that in every coding process, there are two separate coding operations, rather than just one operation that is being labelled differently by insiders and outsiders" (Bailey, 2007: 83). However, it should be noted that, from the understanding of multiplexity and the continuous increase in complexity within the individual as a metasystem, through the continuous self-creating of complex systems of different kinds, there may actually be more than two encoding operations. Considering that the individual creates primary and secondary representative mental systems (Carlston, 1994) and that several other mental system sets have been identified (Mayer, 2001), it can be argued that the 'communication' between and among various biological and mental subsystems, whether it occurs through linguistic symbols or other signals, should necessarily entail various forms of (en)coding and various 'observers' observing the various 'observing systems'. Mingers's classification of self-referential systems (1997) (as these relate to Boulding's hierarchy of complexity, published in 1956) provides further insight into structural coupling, which refers to the consensual domain of interactions when two or more autopoietic systems interact recurrently with each other. This means that structural coupling may lead to interlinked sets of interaction between these systems, which may appear to some external observer to be coordinated. As Mingers (1997: 305) explains, "[W]ithin a consensual domain, the coordinations of action may become recursive; that is, particular

coordinations of action may become tokens or symbols of others". Boje and Arkoubi (2005: 139) understand Boulding to be arguing that the sign representation gives way to more multilanguaged ways of envisioning human systems. The constraints of space here do not allow for a more detailed discussion of third-order cybernetics. The conceptualisation of cybersemiotics below aims to provide further insights into the issues of control and structural coupling that occur through second-order cybernetics in particular, but then also, necessarily, through third-order cybernetics.

1.5 Cybersemiotics

Within Craig's taxonomy of communication theory as a field, the semiotic and cybernetic traditions are distinct fields of enquiry. The term *cybersemiotics* is used by Brier (1996; 2005), in particular, to indicate the correlation between second-order cybernetics and semiotics. Bopry (2007: 36) also observes the similarities between these two fields: "In both semiotics and second-order cybernetics theorists are making a good faith effort to transcend the mind-body dichotomy that has plagued modernity." This is accomplished by explicating the role of the observer (the interpreter, encoder or decoder), who operates from her/his own base of experience (recursivity). From a communication perspective, *cybersemiotics* can be described as a study of how individuals (as autopoietic systems) create the environments with which they interact, and establish relationships with these various environments that are as much a precondition for their being as for their internal autopoietic organisation. Bopry (2007: 33) explains that the individual as a composite unity of an operationally closed system has the purpose of self-preservation, in other words, the purpose of the maintenance of her or his identity. Luhmann (1996: 343) argues that social systems are also operationally closed: "They use communication and nothing but communication to reproduce themselves. ... Whatever has to be done by a social system has to be done by communication." Luhmann (1995; 1996) limits his application of social autopoiesis to conscious levels, whereas Maturana and Varela (1980) argue that basic thought processes – that is, communication between and among mental systems – are not necessarily either symbolic or linguistic. *Cybersemiotics* can therefore be described as the study of the structural couplings that form the coincident domains of interaction between systems and subsystems of various kinds (biological, mental, and social) whereby the said systems create their identity and distinctiveness in relation to other systems through signs as forms of communication. Bopry (2007: 396) describes the latter as follows: "Communication and consciousness are co-constructions on both the biological, the psychological and the social level between living systems – and again between each of the systems and their environment." Both Bopry (2007) and Brier (2005) extensively discuss the connections between semiotics and second-order cybernetics, which warrant further exploration in the field of communication studies. Some of the points of emphasis in the two dominant metaphors in organisation studies are illustrated in Table 2.

Table 2: Mechanistic versus organismic metaphors

Mechanistic	Organismic
Goal-directed	Purposeful
Seeks to prevent equilibrium	Always informationally open, but operationally or functionally closed
Reacts in predefined ways	Adaptive
Functionally unified to seek system survival	Functionally unified to seek system survival

In comparison with these general distinctions between mechanistic and organismic metaphors that have been applied to the study of organisations, the application of second-order cybernetics and its distinct shift towards the study of the individual as unit of analysis presents a different understanding of power relations and of system hierarchy. This then suggests a kind of resonance between cybernetics and postmodernism, which is explored in the next section.

2. MODERN AND POSTMODERN METAPHORS

A new metaphor not frequently referred to was that identified by Morgan (1981) – the *schismatic metaphor*. It contains not only the other existing metaphors, but also those we are in the process of co-creating – the *autopoietic metaphor*.

In his publication, *The schismatic metaphor and its implications for organizational analysis* (1981) Morgan refers to "the problems involved in using models and methods drawn from the natural sciences for the study of social affairs". In the said paper, he elaborates on the schismatic metaphor:

> ... with a view to developing a perspective which specifically counters the assumptions embodied in theorizing based upon mechanical and organismic metaphors, that social systems are functionally integrated and oriented towards the achievement of a shared future state. The schismatic metaphor seeks to focus attention upon the disintegrative tendencies of social systems, with a view to highlighting properties and explanations either ignored by conventional systems models, or else regarded as pathological, abnormal, temporarily deviant states to be remedied in some way. It seeks to examine schism as a natural system property, and thus provide a counterweight to the emphasis normally placed upon the system-maintaining properties of social systems.

Schism as a concept is known within both modern and postmodern discussions and contains the central concept also to be found in first-order cybernetics, second-order cybernetics and autopoiesis, third-order cybernetics, complexity theories, and cybersemiotics, namely control. Morgan's description of a schismatic system (1981) characterises it as an open system that displays patterns of activity that lead to the increasing differentiation and functional autonomy

of constituent elements or subsystems. Taking into account the current understanding of system closure, this means that the elements or subsystems that are open are created within operationally closed systems, such as the individual at the micro level, or the organisation at the macro level of analysis. The schismatic metaphor portrays how the interests of the elements or subsystems take precedence over the interests of the larger system (as defined by its boundaries within a particular inquiry), and in their quest for autonomy, they serve as internal forces that may manifest as change within the larger system. Morgan (1981: 24) contends that unlike mechanistic or organismic metaphors – where elements and subsystems are considered to be functionally unified – schismatic systems display a propensity towards factionalisation and fission, the latter constituting endogenous forces for change that may lead to the ultimate separation and opposition of system parts.

In terms of system functioning, and the understanding of feedback loops among elements, subsystems and systems, Geyer (1995: 8) remarks that positive feedback loops cause morphogenesis – rather than homeostasis or change – which is the motor of change. Van der Zouwen (1997: 851) describes *morphogenesis* as social systems' ability to change their structure in the course of their functioning. Luhmann (1995: 352) adds that "[A]lthough morphogenesis creates new structures, it is also structural change. It builds on existing systems, for otherwise it would not be possible. This follows from the basic concept of autopoiesis". In the schismatic system, on the other hand, the interaction between system elements or between subsystems or systems can be described as 'schismogenic', in which 'positive feedback' obtains new meaning, as Morgan (1981: 26) argues:

> When the concepts of 'schismogenesis' and 'functional unity' are linked and developed within the bounds of a single conceptual framework concerned with showing that social systems are characterized by powerful disintegrative tendencies as well as those which may sustain unity, we are provided with a powerful framework for social analysis.

A closer look at the postmodern organisation provides further insights into the potential disintegrative tendencies that are created within individuals as complex systems, thus between individuals within the postmodern organisation, as discussed below.

2.1 Towards the postmodern organisation

The terms *modern* and *postmodern* have become common currency in intellectual debates within organisation studies (Chia, 1995). The postmodern is variously interpreted as an 'epoch', a 'perspective', or a new 'paradigm' of thought. McSweeney (2006: 22) states that an increasing number of studies point to the demise of the bureaucratic organisation and the emergence of the new post-bureaucratic organisation. This 'discourse of ending' is often expressed as a 'paradigm shift' or profound movement beyond bureaucracy towards new organisational forms such as virtual or network organisations. Boje (2000) argues that the very notion of a postmodern organisation is contested because there are many debates between sceptics and adherents about the idea and possibility of a 'postmodern organisation'. Within these different domains, the erosion of an authoritative point of reference has stimulated

new modes of expression that at once challenge our notion of a single reality and suggest alternative ways to combine styles, genres and worldviews (Christensen, Torp & Firat, 2005).

Power (1990) maintains that there is no absolute line demarcating the modern from the postmodern, since the postmodern comes to signify both the termination of the former and its continuation. According to Ramsey (2003: 552), postmodern ideas have, for the past 15 to 20 years or possibly longer, influenced academic approaches to management and organisation. Boje (2000) suggests that postmodern organisational theory is increasingly being entertained as an epistemology that runs counter to logical positivism and offers a grasp of the postmodern turn. Chia (1995: 597) argues that postmodern thinking involves the radical questioning of existing academic disciplines such as organisation studies. Postmodern thinking is not so much concerned with the *facts* of organisation, or with the *organisation of work* (as is mainstream organisation theory), as with the *logic* and *organisation of thought*. This style of thinking in organisational analysis strives faithfully to chart out the precarious, emergent assemblages of organising with a view to understanding the processes of exclusion, negation and suppression that collectively contribute to the accomplishment of modern organisations. Modern organisational theorising is retrospective in its assumption that the organisation to be an accomplished phenomenon, while postmodern thinking is an attempt to understand the emergence of the organisation (Chia, 1995: 601).

2.2 Postmodern organisational theory and analysis

Clegg (1994: 316) argues that unlike the highly differentiated and modernist bureaucracy, the postmodern organisation is based on a de-differentiated form, and has structural characteristics that reflect ethno-industrial theories of 'flexible specialisation' and 'post-Fordism'. For Cooper and Burell (1988: 106), postmodernism should seek to explode the myth of robust structural relations through establishing the fragile character of organisational life. They (1988: 106) argue that postmodern analysis must focus on "the production of organisation rather than the organisation of production". Hassard (1994: 318) concludes that the constructs we employ to make sense of the organisation are moral imperatives that serve to presuppose certain features of organisation, while excluding the possibility of others. On the one hand, the epoch position provides positivist descriptions that fail to reflect the philosophy of postmodern analysis, and, on the other, the epistemological position explodes the myth of structural form, yet fails to account for the everyday experiences of social actors.

According to Hassard (1994: 318), neither position develops a framework in which the formal organisation is acknowledged as a phenomenon that is accessible to postmodern deconstruction. Nÿstrom (2000: 109) argues that instead of emphasising scientific rigour, formal logic and rationality as a basis for understanding and managing society – as in the modern bureaucratic organization – postmodernism can be seen as being characterised by pluralism, fragmentation, ambiguity and indeterminacy, defying attempts to generalise and extrapolate from past experience.

This view, Nÿstrom (2000: 109) argues, marks the end of the modernisation process and of modern society. In contrast to this view, Nÿstrom (2000: 109) proposes a management perspective that adopts a balanced approach to both modernism and postmodernism, so that theory generation and implementation can assist in understanding and evaluating individual, organisational and societal action. Nÿstrom (2000: 114) asserts that such a balanced, creative approach should assist in bridging the gap between academics and practitioners in describing and understanding their relevant realities.

Boje (2000) argues that postmodern theory does have significance in the fields of management and business, especially in respect of workplace democracy, ecological sustainability, and finding less violent forms of production and consumption. Boje (2000) further asserts that postmodernism is both poly-vocal and polysemous, and thus deserves less polemic and more tolerant treatment from modernists and from supportive and sceptical postmodernists alike.

It is thus clear from this discussion that the modern and postmodern are in fact inextricably intertwined but, as Chia (1995: 580) argues, it is nevertheless possible to accentuate their cognitive styles, intellectual properties and theoretical foci, and thus also to articulate their implications for organisational analysis. In the next section of this paper, the emergence of the postmodern organisation will be analysed by exploring and describing local processes of patterning, social orchestration, ordering and resistance in order to chart the ongoing struggles and contestations intrinsic to the organising process. Within such an approach, the legitimate focus is not on the features and characteristics of organisations, but rather on the microprocesses and micrologics of organising, which are realised through the local orchestration of actions, interactions and interlocking patterns of relationship.

2.3 The postmodern organisation

In the wake of the current global political, economic and social turmoil, a vast array of new management values and methods is emerging within the workplace. Increasing technological complexity and changing lifestyles and expectations, coupled with the growth of knowledge workers, have reshaped management processes and have forced organisations to evolve beyond the traditional bureaucratic model to meet the sophisticated expectations for performance in the twenty-first century (Drucker, 1999). Accordingly, organisations are coming under increasing pressure not only to learn, change and adapt, but also to take actions that are ethically acceptable and sustainable, and that balance the interests of a range of different stakeholders (Rowley & Gibbs, 2008: 357). In this respect, Green (1993: 219) contends that modernism's 'grand narratives' of historical and conceptual justification of unfettered capitalism in particular must be rejected in favour of postmodernism's 'decentering' of perspective, and discovery of 'otherness', 'difference' and 'marginality' as valid modes of approach to experience and moral decision making. According to Schultz (1996: 167), under modernity the tendency is to approach accountability from the basis of individual action and a linear cause-effect conception of responsibility. Within postmodernist organisations, argues

Schultz (1996: 167), rhetorical strategies of decentring, deindividuation and distanciation are utilised to construct social realities, and thus to obscure individual causation and control. Because of this mediation and control, the organisation – and not its members – is morally accountable (Schultz, 1996).

The functionalist preoccupation with managerial, behavioural and systems-related aspects of organisational change has now been supplemented by an interpretivist concern with culture, communication and the subjective experience of coping with organisational life (Gioia & Pitre, 1990). According to Edwards (2005: 269-288), this shift entails that integral approaches to change should consider the exchange relations between social agents in terms of their consciousness, their behaviour, and their cultural and social dimensions. In addition, further considerations should include the social agents' respective developmental stages, lines and dynamics; the learning processes and environments involved in the interaction; the multiple personal and group perspectives that can be relevant to the interaction; and the nature of the artefacts/communications mediating the interaction.

Blackler and MacDonald (2000) discuss how organisational learning varies according to different organisational priorities. By categorising organisational practices as comprising either established activities or emergent activities, and being undertaken either through established relations within (or between) groups or emergent relations within (or between) groups, Blackler and Macdonald (2000: 838) arrive at the matrix depicted below:

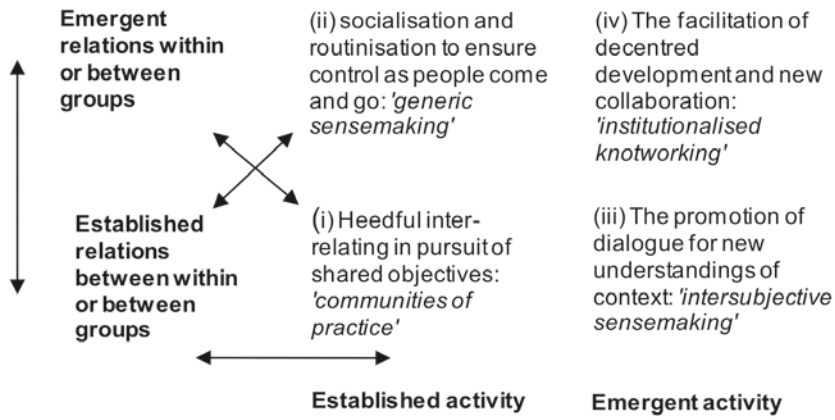

Figure 1: Matrix of organisational practices
Source: Blackler & MacDonald, 2000: 838

The ongoing processes of liberalisation and globalisation have resulted in a significant change in the organisational value system, particularly in respect of the contribution of the individual to the organisation. The continuous lack of trust and identity produced by post-bureaucracy

appears to be one of the primary forces that drive individuals to bring their potential and individuality into play.

According to Cohen (1998), the emergence of information technology within a digital economy creates an upheaval in the modernist system of labour and production, signalling the end of Fordism, a phenomenon that was based on the virtuous circle of rising wages and increasing productivity. Henry Ford and Frederick Taylor disproved Karl Marx: rather than become pauperised, the working class saw its income indexed on the wealth produced, namely, on a time-scale and in a spatial framework that were foreseeable and fixed.

Cohen (1998) contends that a revolutionary organisation of labour is emerging that is based on a number of key principles: huge inequalities in job remuneration and job status, and the hyperprofessionalisation of tasks, as a result of which unskilled workers are rejected and wide gaps open up within a particular occupation – the so-called 'economy of superstars'. In short, it is a revolution that undermines the foundations of work and shifts us away from identity and into uncertainty.

According to Hassard (2002: 885-892), the linear-quantitative tradition – and, specifically, its key notion of temporal commoditisation – is perceived as modernist in that it reflects those time-based technologies that were developed in the wake of industrialisation and mechanisation. Modernist linear time images stem from the progressive commoditisation of the labour process, and they reflect the social construction of organisational symbolism and culture.

Time-space compression of physical processes and human experiences is regarded as a postmodern condition, in which the notion of 'instantaneous time' reflects organisational practices that are based on time frames that lie beyond feasible human consciousness. According to Hassard (2002: 889), the postmodern is said to bring with it more open and fluid social identities, as compared with the traditionally fixed ones of the modern period, and, in particular, those related to family, work and career. Within a postmodern approach, time is valued not as a commodity, but rather as a facilitator of deliberation and action.

In order to cope with increased complexity and speed, the postmodern organisation has had to redefine, restructure and integrate work culture for better-quality human relationships. Kumar (2006) refers to this as a paradigm from a culture of chance to a culture of choice.

The culture of control that permeated the last decade has changed into what Huzzard (2004: 352) refers to as "legitimate peripheral participation". Contu and Willmott (2003) contend that power relationships in the postmodern organisation are articulated through social practices that produce the 'truths' that make up our self-concepts and the institutions in which our selves are embedded. Power is not exercised by sovereign individuals, but is located in social practices and the relationships on which such practices are built. According to Huzzard (2004: 356), sense-giving is inextricably bound up with issues of power and politics. Huzzard

(2004: 356) maintains that sense-giving occurs through discourse – and this confers power in three ways:

- Through normalising
- Through constraining the way it takes place and where it originates
- Through limiting access to the discourse itself (Fairclough, 2001)

According to Gioia and Chittipeddi (1991), organisational sense-making is collective in that it is related both to generic subjectivity and to interlocking routines, but is practised by individual leaders when they give sense to others through interactions in which followers/subordinates become sense-takers. Huzzard (2004: 357) holds that sense-giving can thus be seen as the mobilisation of requisite variety: a movement from diversity to equifinality at a particular moment in the project.

Kelly (1998) argues that we need new ideas, paradigms and practices to make sense of the tumultuous changes that have come about through the global restructuring of the economy, radical new technologies, and advances in social, political and cultural change. Given the giant leaps in competitiveness in the organisational context, modernist notions of predictability and control fade in effectiveness (Lynch & Kordis, 1988). Predictability and control have been replaced by increased ambiguity and complexity. According to Marion and Bacon (2000), complexity comprises three elements. Firstly, non-additive behaviour emerges from interactive networks – the whole is greater than the sum of its parts. Secondly, the emergent behaviour exhibited in a complex system is unpredictably related to the underpinning causes. Thirdly, complex behaviour occurs in the nebulous region between predictability and unpredictability, i.e. at the edge of chaos. As a consequence, creating the conditions under which emergence might appear is likened to surfing the edge of chaos.

Instability is thus a precondition for change, and the role of organisational leaders is to remove the artificial barriers to change, which discourage innovation. In his seminal work on complexity Geyer (1995) offers the following harrowing conclusions about the legitimacy of orthodox forecasting-and-planning techniques: analysis is no longer pre-eminent; cause and effect contingency is meaningless; long-term planning is impossible; visions are illusions; strong, unified cultures are dangerous; and statistical relationships are uncertain.

Nonaka and Toyama (2007: 372) contend that the rationalistic approach to strategy has resulted in strategic theories that exist apart from the realities of business, because they obscure the most significant reality – that strategy is a dynamic process created and practised by human beings.

McKenna (2005) suggests that while rational judgment is necessary, wise management requires a capacity for counter-intuition, vision and humanity. Karp and Helgø (2008) state that modernist paradigms of leadership are limited, in that they assert leadership as a role with fundamental influence over command and control, enabling the design of appropriate

interventions for future organisational success. Karp and Helgø (2008) maintain that this is not consistent with organisational reality, which is increasingly complex and unpredictable.

Rooney and McKenna (2005: 307) suggest that the discourse on knowledge-based economies is limited by an inadequate conception of knowledge that does not embrace the axiological dimension of knowledge that leads to wisdom. The notion of leadership is thus better understood as a shared social influence that emerges through the process of relating. For a leader this necessitates acknowledging feelings of not being in control as crucial to the leadership process, since it enables followers to experience their ability and find their way to act in the moment. Rowley and Gibbs (2008) argue that good decisions are not simply short-term goal-achieving decisions, but are ones that sustain the integrity of the organisation based on the moral value of the organisational ethos.

It is evident from the preceding discussion that the metaphor of postmodernity, with its emphasis on situated meanings, multiple audiences, counter-rationality, and competing narratives, places great emphasis on sense-giving and sense-making activities in organisations. This holds very specific consequences for those who enact communication roles in emerging organisational contexts. Certainly, the most striking implication, according to Botan and Taylor (2004), is the shift in perspective from a functionalist to a co-creational perspective in which the co-creation of meaning and the building of relationships are emphasised. As complex social systems, organisations are highly interactive and dynamic. According to Geyer (1995: 24), the mechanistic and deterministic Newtonian world view – emphasising stability, order, uniformity, equilibrium and linear relationships between or within closed systems – has been replaced by a new paradigm that is more in line with today's accelerated social change in its emphasis on disorder, instability, diversity, disequilibrium and non-linear relationships between open systems, morphogenesis and temporality, which in turn leads to increasing complexity. Geyer (1995: 25) describes this as a bottom-up rather than top-down process, without any central controller leading it and in which local units produce new levels of complexity through interaction.

Given the clear correspondence observable between postmodern and cybernetic perspectives, some of the implications for the study of organisations are considered here. It is, at this point, considered significant to illuminate that 'laws of form' (frequently referred to in discussions of social autopoiesis) refer to the differentiation between systems and the environment. Corresponding to the schismatic metaphor, the emphasis in laws of form is placed on distinction, and in the definition of internal and external system properties and characteristics.

3. IMPLICATIONS OF CYBERNETICS AND AUTOPOIESIS FOR NEW LAWS OF FORM

The schismatic metaphor utilised here has illuminated relations between elements and systems that provide new insight into the study of individuals who create themselves and who co-create organisations. We now turn to the implications of this new understanding.

3.1 The observer cannot be separated from the observation

The shift from a functionalist to a co-creational perspective has led to tensions between linguistically generated intersubjectivity and self-referentially closed systems. Autopoiesis entails a reflective position that is able to provide an autopoietic construction of social systems and knowledge. The construction of knowledge is emerging, pluralist and complex. As such, it transcends the problems related to the subjectivity of knowledge, which undermines the notion of objective observation.

3.2 Reality is co-created

Through structural coupling, autopoietic systems are able to transcend their own limitations. Construction of symbolic representations involves mental operations and social operations. Commonality of meaning reflects the extent to which structural coupling, and thus meaningful communication, occurs. Structural coupling occurs consciously on many levels through the use of language (languaging), and is dependent on commonality, which can be constructed based on assumptions of shared meaning. This entails both mental operations and social interaction.

3.3 Control resides in control of meaning

System control relies on being able to control meaning that is generated through structural coupling. Loose coupling is based on a wide variety of elements that contribute to organisational emergence. Organisational emergence entails complex relationships because of the competition between system elements to expand their sphere of influence and power. As a result, organisational reality is socially (communicatively) constructed and politically motivated.

3.4 Balancing integrative and disintegrative tendencies

Emphasis is placed on disintegrative rather than integrative tendencies. Systems are characterised by instability, and system elements have a natural propensity to break free of the constraints of unwelcome structures. Autopoiesis is sustained by two internally generated operations: (1) conservation, and (2) regulation, which are dynamically interrelated. Conservation requires stability, and therefore also regulation, which offers the possibility of reflection on the entire process of autopoiesis, and thus also on the functioning of the system as a whole. The construction of regulation will never cease, because the conservation of the autopoietic system relies on constructing new levels of regulation. The observer who observes the autopoietic process from the vantage point of dynamic equilibrium – between equilibrium and disequilibrium – can reflect on every stage of the autopoietic process, including his or her own autopoiesis.

3.5 Transcending metaphors and paradigms

The schismatic metaphor, while providing an alternative to the traditional mechanistic and organismic metaphors, stands in stark contrast to the modernist metaphor, which has ascribed central importance to the concept of rationality. The schismatic metaphor provides an approach to social analysis that recognises that the survival of social systems is problematic and hinges on a balance between integrative and disintegrative forces. Many of these insights are not new, and have been elaborated on by a number of postmodern theorists who have grasped the essential features of this metaphor. However, it does provide a systematic and coherent alternative to orthodox models and provides a much-needed alternative basis for analysis.

3.6 Challenges to communication as a discipline

Thus far, debates on revisiting cybernetic concepts have largely been conducted in other social sciences disciplines such as sociology, despite the challenges a co-creational perspective poses for communication in general and specifically for organisational communication. Given that communication is used by social systems as their particular mode of autopoietic reproduction (Luhmann, 1986), communication scholars should take up the challenge of participating and even leading these disciplinary debates.

4. CONCLUSION

By excluding metatheories like cybernetics from our discussions communication theorists run the risk of homogenising our knowledge base and of our being trapped in our own intellectual assumptions. Thus far, communication as discipline has been slow to come to grips with a shift in theoretical paradigms and to grapple with the challenges that an emergent and a co-creational perspective pose for our understanding of the role of communication in the autopoietic reproduction of social systems such as organisations. Studies such as this one provide a systemic and coherent alternative to orthodox communication approaches in the study of organisations, and they provide a much-needed alternative view for analysis. The real value of re-assessing sociocybernetics and social autopoiesis lies in the fact that it challenges us to be critical of our own assumptions and to evaluate and research organisational communication through a different lens – one that is much better suited to the pluralist, fragmented, indeterminate and ambiguous nature of the post-bureaucratic business organisation.

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