Exploring System Boundaries: Complexity Theory and Legal Autopoiesis

Thomas Edward Webb

Faculty Academic Fellow

C58 Bowland North

Law School

Lancaster University

Lancaster

LA1 4YN

United Kingdom

Tel: (01524) 594570

E-mail: t.webb@lancaster.ac.uk

Fax: (01524) 848137

Abstract:

Autopoiesis is normally considered to be *the* systems theory in law. In this paper complexity theory is presented as an alternative systems approach. In order to position complexity theory as a plausible alternative to autopoiesis I discuss the differing understanding of boundary within each theory, and use this as a vehicle to critique autopoiesis. My critique is situated within systems theory thinking but is external to both autopoiesis and complexity theory (although I must oscillate between the two object of critique). Because both approaches possess an understanding of boundary it provides an effective tool to contrast their differences, while permitting each to be described in its own language. It is argued that complexity theory offers an approach to boundaries as contingent, emergent, interfaces, which the autopoietic construction of boundary can learn from in several ways. More generally it is suggested that the complexity theory approach to boundaries offers lawyers engaging with systems theory a new critical perspective to assess legal constructions.

Exploring System Boundaries

Thomas E. Webb

INTRODUCTION

In this article I critique legal autopoiesis through complexity theory.[1] While both accounts represent systems theory understandings of law and the social, and thus bear a familial resemblance to one another, they present unique views. It is proposed to examine these differing accounts by contrasting their respective understandings of boundary, and use this as a vehicle to illuminate some limitations to the use of autopoietic theory in law. I do not intend to map out a specific theory of complexity for law, which I and others have done elsewhere (Murray, 2008; Ruhl 2008; Vermeule 2012; Webb, 2005), but instead wish to draw primarily on the abstract ideas of complexity which I argue have use in law. The link to law is indirect, speaking specifically to legal autopoiesis, and how it deals with boundary, in comparison to the complexity approach. Additionally, while the concept of boundary is certainly shared by each approach, most likely because of their related history as systems theories, it is experienced differently in each. Consequently, it should not be viewed as merely a concept in common between the two approaches. I draw on three features of the complexity theory understanding of boundary, specifically its contingent, emergent, interfacing nature, and contrast these with autopoiesis. It should be noted that the relative under-examination of complexity theory approaches in law means that this paper only represents a first foray into the relationships between autopoiesis and complexity theory.

While my critique remains internal to systems theory thinking in general it is, by necessity, external to both autopoiesis and complexity theory. Having said this, critique must oscillate between its external vantage and object (and here to complicate matters there are two

objects). However, in running between, towards, and away from the horizon of one or the other 'in a frenzied attempt to see more' of each, it will miss what is behind as its field of vision narrows (Philippopoulos-Mihalpoulos, 2010, pp.24-25, p.54; see also Cilliers, 2005a, pp. 606, 608). As a consequence of my position as observer, there exists the possibility that elements of each approach may be lost, either in the oscillation or the translation; I do not think that this can be avoided. This is a problem which both approaches appreciate too, and which I accept as an unavoidable consequence of placing necessary limits on an investigation; indeed, it is the quintessential consequence of boundary drawing (Preiser and Cilliers, 2010, p.276). In recognising this problem my argument may avoid, as far as is possible given autopoietic self-referentiality, the charge of 'not engaging with the theory, but only with [my] own (inadequate) observations of the theory' (King, 2001, p.31).

Although a focus on locating the differences between the two theories via a critique of one by the other is inherently divisive, this should not be taken to mean that I deny the utility of autopoiesis as an analytical tool. My goal is not to suggest that autopoiesis is useless, nor that complexity theory holds all the answers. Instead, I argued that we should consider whether the autopoietic approach is always the most appropriate, that complexity theory offers an alternative analytical perspective, and that the introduction of elements of a complexity approach into autopoietic theory may permit the former to rectify some of the perceived shortcomings of the latter, and *vice versa*. Essentially, it must be accepted from the outset that 'no single method will yield the whole truth' when dealing with contingent, emergent, complex social phenomena (Cilliers, 1998, p.23). While it is undeniably the case that there is common ground between autopoiesis and complexity theory, and while the uncovering of these similarities would likely be of benefit to both approaches (for the possible beginnings of this process see Webb, 2005), there is a staunchly embedded presumption in favour of autopoietic theory in law which must first be faced.

DEFINING BOUNDARY

Although boundary is a feature common to both approaches, it is experienced differently in each; before proceeding it is worth sketching these for reference. The complexity theory approach to boundaries views them as contingent, emergent interfaces between internal and external. Contingency is the idea that the outcome which occurred, or the conclusion that was reached could have happened otherwise, or been decided differently (Cilliers, 1995, p.130; 1998, p.106; 2001, p.145; 2008, p.46). An argument based on emergence holds that the characteristics of the whole cannot be derived from knowledge of its parts alone, but instead can only be revealed by considering the *interactions* between those parts (Cilliers, 1998, pp.1-2). Thus, the whole is said to be greater than the sum of its parts, such that the whole, comprised of many interacting parts, possesses characteristics which are not necessarily present in any of its constituent parts alone (Richardson, 2004, pp.76-77); the characteristic only comes about as a consequence of interaction. The notion of boundary as an interface builds on the idea of boundary as emergent and contingent. The idea of an interface suggests that the role of the boundary is to facilitate and link interaction between the internal and the external (Cilliers, 2001, p.141). The purpose of the boundary under a complexity theory approach is not to offer a definitive construction of anything, but is instead to give form to the contingent, emergent frameworks of understanding individuals use to 'anticipate the world' (Waldrop, 1994, p.177; original idea in Holland, 1995, pp.31-34), and aid the act of interfacing these accounts with others as they engage in the 'agnostics of the network' (Cilliers, 1998, p.120). This engagement is important because without it how is an observer or system able to differentiate and give meaning their account; their 'narratives only make sense in terms of the contrast or difference with their surroundings' (Cilliers, 1995, p.128; see also 1998, p.116).

The autopoietic approach conceives of boundaries as the line distinguishing inside from outside, but also as a tool to connect one and the other; the precise configuration of the boundary is particular to each self-referential system. The connection between inside and outside is intimate, defined by the paradox 'I am what I am *because* I am what I am not', the unity of difference (Philippopoulos-Mihalopoulos, 2010, p.67). The system only knows the nature of its boundary based on an internally constructed awareness of what is beyond it. The self-referentiality of the system means that the whole process of constructing the environment is an elaborate charade, 'an illusion by and for the system' to allow it to function (Philippopoulos-Mihalopoulos, 2010, p.81). The system constructs everything, including its boundary with the environment and the environment itself internally through the recursive application of the system's operative code to itself 'reproducing communication by communication' (Luhmann, 1992a, p.1424; see also 1988a). This process represents only a simulation of 'the difference between self and other … by the system within itself', which creates merely a 'blind simulacra of an outside' inside (Philippopoulos-Mihalopoulos, 2010, pp.79-80).Thus, in any assessment of either inside or outside what the observer witnesses is one being 'momentarily thrown forward' *relative* to the other internally (Philippopoulos-Mihalopoulos, 2010, p.41 see also p.43). The boundary aids the recognition generated through difference, of understanding the inside relative to the outside.

CONTINGENCY

Here, contingency relates to the assessment of the location of the boundary, as to whether or not the boundary has been determined correctly by an observer or system. In particular, from a complexity approach perspective, it is concerned with the effect that the context of the observer or system has on the determination of the boundary. In a legal setting, the meaning of words, the intentions of judges and legislators, and the precise context of the case are all

open to interpretation, they are all affected by context (see Webb, 2005, pp.237-238). The reasons for the possibility of divergent outcomes/decisions relate to the importance of context in making choices, such that altering context changes the observer's perspective (for e.g. the legislator or judge's perspective) leading them to draw different conclusions (see further Cilliers, 2010, p.16). Similarly, there are limits to what each individual holding such a perspective can know about the social world, and thus being in possession of varied information, or choosing to interpret the same information differently will lead to divergent perspectives, and a consequent alteration to the decision or outcome "*do*" (on provisional and local knowledge see Richardson, *et al*, 2001a, p.12; see also Webb, 2005, pp.235, 241). This can manifest as different advocates advancing alternative lines of reasoning in the same case, based on privileged conversations with their client not accessible to their counterparts. More abstractly, the particular personal history of each advocate or judge will impart upon them unique information, resulting in personal lines of reasoning. Furthermore, the product of changing context "*c*" or knowledge "*k*" should not be thought of as easily derivable in terms of $c + k = do$, as this implies a simplistic, linear relationship between c, k, and do; when, as is discussed in a moment, this relationship must be an emergent one. Therefore, the boundary under a complexity approach can be thought of as contingent because, had an alternative perspective been in play, a different account of boundary would have been given.

The notion of contingency appears in both autopoiesis and complexity theory (for e.g. in complexity see Cilliers, 2001, p.145; in autopoiesis see King and Schütz, 1994, p.271), however it occurs at different levels within each. Under a complexity theory approach contingency requires us to question not just the assumptions made about the location of a given boundary, but also the foundations of those assumptions. Conversely, autopoiesis offers a more confined understanding of the concept, where contingency relates to the idea that what has been given as the boundary assessment could have been otherwise, but operates

under the wider assumption that functional differentiation is an appropriate means of determining the boundary. I now want to explore the occurrence of contingency in complexity theory and autopoiesis as it relates to (un)certainty and (dis)agreement about the position of the boundary.

(UN)CERTAINTY

Boundaries in complexity theory are neither singular nor in their multiplicity ever concretised. Rather, there are a countless understandings of any given boundary being advanced constantly by participating elements of the social, always in a state of becoming (Cilliers, 2001, pp.140, 146). This is because the position of the observer or system making a boundary assessment is contingent, rather than just the outcome they propose being so. Judgments about boundary are made in a situated context, on the basis of limited, 'unevenly distributed' knowledge (Webb, 2005, p.235; and see Cilliers, 1998, pp.4, 92).[2] The fact that knowledge is relevant (for example to do with law) is not enough to bring it within the system (*cf*. King, 1993, p.223; 2009, p.72; Luhmann, 1989, pp.141-142; 1992a, pp.1427-1428; Philippopoulos-Mihalopoulos, 2010, p.88). Instead, the whole process of constructing the boundary needs to be thought of as 'provisional [and]… local' (Richardson, *et al*., 2001a, p.12). As a consequence, a boundary assessment can only ever offer a 'partial' view of the whole (Richardson, *et al*., 2001a, p.9), and so may miss out information that subsequently alters the meaning significantly (Cilliers, 2007, p.161). Thus no individual judgment will deal with every aspect of the law in a given area, nor will it necessarily make clear the legality of action in every circumstance within the limited scope of the case. It is more likely that the case will only apply to its limited context, such that any subsequent application of the case in differing circumstances represents an interpretation of the case from a new context, requiring the construction of a re-imagined boundary. This does not affect the legitimacy of the perspective offered, either in the original or revised instance, because incompleteness

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does not denote inaccuracy. However, it does mean that our frameworks for making sense of law, always exist 'in the shadow of the whole' (Richardson, 2004, p.77; see also Webb, 2005, p.232). The message from complexity is not that it is inappropriate to draw boundaries; rather, it is inappropriate to treat those boundaries as the only correct formulation at a given time. We should be less confident about the position of boundaries. The perspective of complexity is not one of 'anything goes' (Cilliers, 1998, p.*viii*), each perspective resides in the context of a wider body of law, and of the social, observations and boundary constructions can only be understood relative to the wider discourse(s) in which they are participating (Cilliers, 1995, p.128). Outlandish claims are marginalised by the 'agnostics of the network' (Cilliers, 1998, p.120). Ultimately, this is a welcome situation for law as it invites the continuation of the 'process of generating understanding' (Cilliers, 2005b, p.260). The recognition that context is central to the construction of boundary allows judges, advocates, legislators and citizens to justify their reformulation of precedent.

Autopoiesis conceptualises the boundary as more clearly (although not always definitively) defined, because society is viewed as a system comprised of normatively closed, functionally differentiated autopoietic sub-systems (Luhmann, 1989, pp.137-138), maintained by self-reproduction of themselves, and their boundaries (Luhmann, 1992a, p.1425), on the basis of their function (Luhmann, 1992b, p.149). Law's function is to maintain legal 'counterfactual expectations' (Luhmann, 1992a, p.1426), which are expectations held in spite of disappointments (breaches of the law) (Luhmann, 1988a, pp.19, 22; 1992a, p.1426), and decide on the basis of these expectations whether an action is lawful or unlawful (Luhmann, 1989, p.140). In deciding whether expectations have been met or disappointed the autopoietic legal system is said to create a space wherein conflicting accounts can be proposed and debated (Philippopoulos-Mihalopoulos, 2010, p.68; Torpman, 2003, 90), but it would appear in the end that a final, single decision will be reached. This aspiration towards

certainty can be considered by looking at when autopoietic systems *know* the position of the boundary, how the relationship between inside and outside anticipates the determinability of the boundary, and finally how the use of coding, and the reliance on functional differentiation, suggest the existence of only a limited form of self-produced contingency, pointing to an enhanced degree of certainty about the boundary.

The reader will recall the earlier discussion of limitations caused by the focus of critique. That idea has some relevance here too. For autopoiesis, the contingency of the decision as to the location of the boundary appears to exist prior to, and after the decision, but not at the moment of decision itself. Thus, while there is a distinction to be made between inside and outside it seems fleeting, such that if one locates the inside/outside distinction in one place, then it has likely been mislaid elsewhere. Similarly, to turn away from the now-established distinction and to look elsewhere for another suggests that the observer will no longer know the position of the old boundary definitively, because it resides in the observer's blind spot; the observer is confined by the 'limits of the eye' (Philippopoulos-Mihalopoulos, 2010, p.13). Consequently, beforehand a form of contingency exists because the problem posed is being debated in law, there is no settlement. But the absence of a settlement in perpetuity would render the legal system ineffective, pointless; it must give an answer. Thus, in the instant that the observer or system focusses on the boundary's position it can be sure of its position, because it is looking at it. However, in turning away it moves into the blind spot, the position of the boundary was known in the past, but where it is now becomes unclear. In the limited moment that the boundary is observed, the autopoietic approach appears to suggest that some sort of certainty temporarily crystallises for law, and perhaps also across society (where certainty is reflected through its reconstruction in other sub-systems). In complexity theory the moment of certainty never crystallises. Where the boundary is drawn is unique to the individual assessing it in a limited context on the basis of the knowledge they possess. Such

an individual will never accurately determine the position of the boundary because they are not omnipotent, and they are aware of this. They will be uncertain about the method used in the prior discussion, they will be unsure of the answer produced, and when they turn away they may even be unclear about what they turned away from. In the moment they only recognise the unavoidable requirement to make a decision, and so must pretend certainty ((Richardson, *et al*, 2001a, p.16; 2001b, p.44).

The intimate relationship between inside and outside in autopoiesis, experienced through the unity of difference over the boundary, builds on the issues surrounding blind spots discussed above. The intimacy in difference between inside and outside is encapsulated in the notion that 'Law's environment is everything to which the legal code does not presently apply.' What is not of law now, may yet cross into law in the future; 'what is environment presently can always become of the system', and vice versa (see Philippopoulos-Mihalopoulos, 2010, p.80). This should be read alongside the notion of re-entry whereby the internal construction of the environment re-enters the system from within (Philippopoulos-Mihalopoulos, 2006, p.226; King, 2009, pp.79-82). As such, where it might previously have been thought that the legal system interprets external events as legal, bringing them into the system, this is an inaccurate representation of the autopoietic process. Everything, even external noise, is an internal creation of the system (Philippopoulos-Mihalopoulos, 2010, p.88; Bankowski, 1996, p.75). Therefore, it is more accurate to say of the autopoietic legal system that what is legal is 'latently already in' the system (Philippopoulos-Mihalopoulos, 2010, p.88; see also King, 1993, p.223; 2009, p.72; Luhmann, 1989, pp.141-142; 1992a, pp.1427-1428), such that all legal events happen *within* the legal system, they are *never* beyond it. The intimate relationship between inside and outside is really an 'internal crossing' (Philippopoulos-Mihalopoulos, 2010, p.81), and not a relationship between actual external and internal realms.

The idea of internal crossing can be connected to a form of contingency which suggests that the creation of a space for disagreement inside the system (Philippopoulos-Mihalopoulos, 2010, p.68; Torpman, 2003, 90), to simulate the position of the legal system in discussion with other systems. There is the creation here of the possibility that hypothetical dormant elements of the legal system could become active in the light of system developments. The legal system's code can be used to simulate these possibilities, to process the information and render an image of the boundary. This implies that the autopoietic legal system is able to access all information necessary to answer questions about legal/illegal all the time, regardless of location (implied in Luhmann, 1992b, p.181). This sentiment suggests that the boundary can be determined, and will continue to be identifiable to the system, because it can conceive of its own hypothetical latent elements as future possibilities that are already somehow within its being. Thus, a weak form of contingency exists, in a controlled, self-produced, expected way.

In addition to the binary code, the autopoietic approach also relies on functional differentiation as a method to structure its view of society. I said earlier that under a complexity approach contingency is pervasive; relating not just to the contingency of the outcome but also to the process which generated it. Consequently, the complexity approach tends not to stipulate that a specific methodology be adopted for its application, suggesting instead that it should be thought of as a set of tools which the user can adapt to their particular purpose (Walby, 2007, p.456). This understanding acknowledges that a single means of employing a complexity approach would encounter problems as it was applied to an increasing number and variety of questions (although see discussion of the London School of Economics complexity lexicon project in Richardson *et al*., 2001a, p.11). Moreover, the contingency which saturates the complexity approach must, on its own terms, acknowledge the impossibility of creating a standardised way of thinking complexly. It is argued that one

must instead approach these questions 'playfully' allowing for 'different avenues of advance, different viewpoints' and so on (Cilliers, 1998, p.23). This entails the acknowledgement that it is impossible 'to tell a single and exclusive story about something that is really complex' (Cilliers, 1998, p.*viii*).

The autopoietic approach acknowledges, to an extent that the ultimate process relied on for the production of boundaries, functional differentiation, is itself the product of a contingent choice. It is recognised that 'the legal system originates in the arbitrary point when society became functionally differentiated' (Philippopoulos-Mihalopoulos, 2010, pp.67-68; see also Luhmann, 1989, p.139; 1992a, p.145), but this is acknowledged more as a matter of practicality than contingency. It is said that 'just as any other system, the law requires distinction in order to be observed as a system' (Philippopoulos-Mihalopoulos, 2010, p.68; see also King, 2006, p.41), which suggests that, arbitrary or not, the distinction had to be made so that things could be said by the observer. Thus, while autopoiesis acknowledges contingency within its own descriptions, the nature of this decision is not to do with things being decided on the basis of something other than functional differentiation, but instead that the particular outcome of functional differentiation could itself have been otherwise.

The autopoietic approach makes claims to have considered the uncertainty generated by contingency, but it frames the meaning of contingency and uncertainty in a limited way. However, viewed from the perspective of the complexity approach, contingency suggests the position of the boundary is unknowable, whether it is in the blind spot or right in front of the observer. It is also argued in the autopoietic approach that the relationship between inside and outside, particularly when viewed in conjunction with the creation of a space to entertain possibility permits not just the existence of contingency, but also the management of contingency. The complexity theory approach argues that contingency cannot be managed in such a way that the boundary can be discerned, that is not the essence of what contingency

entails. The idea that contingency can be contained at a certain level of reasoning is encapsulated in the assumption that functional differentiation is appropriate, and that its use did not involve a contingent choice being made. The code and functional differentiation display only a limited self-awareness of contingency, leading to a misplaced certainty about the position of the boundary.

The complexity approach accepts the need to draw boundaries for the purposes of analysis (Cilliers, 2001, p.141; 2005a, p.606), however it must be acknowledged that one is never certain about those boundaries. Instead they are always in flux and must 'be continually revised' because 'boundaries… cannot be identified objectively, finally and completely' (Cilliers, 2005a, p.612). Whereas in autopoiesis contingency relates only to the idea that what has been decided could have been otherwise, in complexity it extends beyond this to the framework on which the decision is based. It is not that this perspective argues that functional differentiation is an inappropriate way of conceptualising the social, nor that it might have the right answer. It is the absence of reflection on the contingency of the whole edifice which the complexity approach reveals. To say that the choice of functional differentiation was arbitrary, or that the description of the legal system as an autopoietic system is arbitrary is unsatisfactory (Philippopoulos-Mihalopoulos, 2010, pp.67-68); the autopoietic approach needs to delve into the contingency discussed above (previous comments are insufficient see Luhmann, 1997, p.43).

(DIS)AGREEMENT

Closely related to the type of certainty (or contingency minimisation and containment) proposed by the autopoietic approach to boundary in specific instances, is an absence or suppression of the possibility of disagreement about its more general structure. A complexity approach understanding of the social consists of many competing, provisional accounts. This understanding makes space for the possibility of disagreement as to the appropriate

boundaries of, in this case, law. This means that conflicting decisions about the boundary of the legal system, even where they are mutually exclusive, will not cause the unravelling of the legal system; indeed, a complexity approach finds the notion of a single legal system difficult to comprehend. While there is a system of processes which society labels as the legal system, the proper purview of that system (the location of the boundary) remains perpetually in question. Under a complexity approach the boundary of the system should be thought of as 'a function of the activity of the system itself, and a product of the strategy of description involved' (Cilliers, 2001, p.141). Thus, each observer operating under a complexity approach will, while accepting the existence of a given set of processes (for e.g. legal processes such as judicial review proceedings), produce their own contingent boundary assessments of the proper limits of the system, essentially defining the legal system in an infinite variety of ways.

Autopoiesis seems to operate in the opposite direction. I have already discussed that the appropriateness of functional differentiation is presumed under the autopoietic approach, or that the contingency of the choice does not appear to have been addressed in detail. Drawing on functional differentiation as the basic framework for boundary construction leads the autopoietic approach to begin with the presumption that certain systems can be defined. As such, whereas complexity theory posits a multiplicity of accounts of the legal system (some of which will question the label "legal system" itself), autopoiesis begins from the position of there being one account of the legal system which is then rendered into other systems, and also the legal system's self-image construct. More accurately, this account is known only in its full sense to the legal system itself, while all other systems attempt an internalised reconstruction of the legal system as part of their efforts to build a picture of the environment. The possibility of disagreement about *the* boundary of any given system is therefore expected and accommodated in the complexity approach, whereas it may cause some difficulty in

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autopoiesis. For example, in looking for concrete counterfactual expectations produced by the system's autopoietic processes (Luhmann, 1988b, pp.344, 347), problems arise when conflicting expectations are produced. Although it may be possible to manage these disagreements internally in 'a space in which the problem of the law is set up as a question' (Philippopoulos-Mihalopoulos, 2010, p.68), this method appears to be artificially contained by the autopoietic framework. The autopoietic approach is forced to construct the notion of disagreement about the proper boundaries of sub-systems within individual systems, because anything to do with law is already part of the legal system, politics with the political system, economics with the economic system and so on. The disagreement seems then to become somewhat irrelevant; where is the route around disagreement between sub-systems to resolution? There is only more self-reference. While I do not deny that the framework offered by autopoiesis deals with the problem, I do not think it does so satisfactorily in contrast to the complexity approach, which exists on the basis of on-going discussion (Cilliers, 1998, p.120). Having said this, I cannot see a means of overcoming the issue using the present framework of autopoietic thought which does not require either the outright abandonment of functional differentiation as the sole methodology, or at least the creation and exploration of the possibility of disestablishment.

In the complexity approach accommodation of disagreement is achieved by the acceptance of the likelihood of varied boundaries, the recognised contestability of boundary conclusions, and the provision of a process for the management of disagreement through the 'agnostics of the network' (Cilliers, 1998, p.120). Thus, uncertainty about the position of the boundary is accepted, and disagreement is presumed. In contrast, autopoiesis seeks unity through the reduction of internal difference (Luhmann, 1988b, p.339), and appears to relegate the role of contingency to merely part of the processes stemming from functional differentiation rather than a critical tool to reflect on the theory as a whole. The complexity approach demonstrates

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that autopoiesis must re-examine the role of contingency. The autopoietic approach would benefit from looking behind the paradoxes and arbitrary selections which hide functional differentiation from contingency. To try to manage the possibility of conflict as a completely internal process is also to ignore the existence of other valid understandings of the legal system not originating in the legal system itself, yet which are relevant to it, something which complexity theory is unwilling to do (Cilliers, 1998, p.122; Richardson and Midgley, 2007, p.176; *cf.* Castellani and Hafferty, 2009, p.61). One need only recognise that law would often benefit from the consideration of alternative constructions of law posited by non-legal sources, however the autopoietic approach makes such a consideration difficult. The complexity theory approach's conception of contingency may offer pathways to alternative constructions, and mechanisms for seeing past these self-constructed paradoxes.

For complexity theory the demarcation of something as a system can only ever be an exercise in drawing a boundary for the purposes of analysis. What is most appropriately included and excluded from a given analytical reality based on complexity thinking is a contingent question to be answered by the observer in a particular context. We cannot determine what the *real* boundary of the system is because no objective boundary definitively exists; or, rather, we draw boundaries and perceive systems and organisation in society from a particular context (Cilliers, 1995, p.130). Boundaries do not exist independently of our models; they are not tangible and transferable to others (Cilliers, 2002, p.83; 2005a, pp.606-607). Autopoiesis acknowledges that its position is contingent too, 'including its own theoretical premises in the contingency of its descriptions' (Philippopoulos-Mihalopoulos, 2010, p.68), but it appears paradoxically to be able to grasp the location of a boundary with certainty when it focuses on it. Similarly, the complexity approach develops a more plausible means of managing disagreement within its framework, whereas it is not entirely clear how the autopoietic approach masters fundamental disagreement when the only appropriate

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perspective for generating explanations is based on functional differentiation, and internal self-reference.

EMERGENCE

A critique drawing on emergence is concerned with how boundaries are drawn, and the reasoning used to assess them. Under a complexity approach the boundary is the product of numerous perspectives (parts), including that of the system and the observer, as to what the boundary should be. The interaction between various perspectives produces an understanding of boundary which can be thought of as 'both a function of the system and of our description strategy' (Cilliers, 1998, p.4; 2001, p.141; see also Webb, 2005, p.237 and n.43 p.237). Therefore, the boundary is an emergent consequence of our interaction as observers with a perceived system.

This idea can be used to comment on two related, but separate, elements of complexity thinking; anti-reductionism and emergentism. Anti-reductionism is concerned with critically reflecting on the observer's methodology, and the limits of their explanatory capacity (and perhaps attempting to account for the issues which arise). Emergentism is about the processes of boundary formation, and is anti-reductionist in that it acknowledges the limitations of models (models are how we make sense of the world and have to be limited to be manageable and useful), but seeks not to oversimplify the nature of the relationships between parts under examination. An anti-reductionist approach will also tend to possess emergentist qualities, because emergentism carries through the thinking of anti-reductionism into the constructive element of the theory. An approach to boundaries based on emergentism undermines reductionist accounts of systems and their boundaries, by showing that the boundary cannot be derived simply by examining the parts of the system in isolation. It is

proposed to first discuss the notion of reductionism, and the different anti-reductionist stances of the complexity and autopoietic approaches, and then to offer a critique of autopoiesis based on the emergentist perspective of the complexity approach.

REDUCTIONISM

The reductionist method seeks to simplify the question being asked through the elimination of as many variables as possible such that the environment of the object of observation can be controlled, and/or by limiting the number of parts to be observed; it is, in essence, the scientific method. Central to this approach is the proposition that the character of the whole (of the way an object will behave under specified circumstances) can be derived from the sum of its parts. Superficially there is nothing wrong about this approach. In fact, it has been highly effective in analysing a wide range of problems in the many areas of research, particularly in the natural sciences; however, it has its limitations. The overriding problem with the method is its assumption that the character of the whole can always be revealed through an examination of its parts alone, in isolation. This runs counter to the emergentist argument that the whole, particularly when an examination is concerned with complex social phenomena, can only be derived through an understanding of the *interactions* between the parts (Cilliers 1998, pp.1-2; Richardson and Cilliers 2001, p.10; Richardson, 2004, pp.76-77; Richardson 2005, p.617). From the interaction between parts it is argued that characteristics not necessarily present in any of the parts may arise (Vermeule, 2012, p.9).

Both the complexity and autopoietic approaches offer an anti-reductionist position, but they are not rationalised on the same basis. Each approach argues that society is incredibly complex, both also agree that the process of constructing models to make sense of that complexity will act to reduce the complexity of the environment (Philippopoulos-Mihalopoulos, 2010, pp.68-69; Cilliers, 2002, p.78). At this point there is some divergence between the two positions in relation to how the approaches conceive of their anti-

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reductionism. On the one hand, proponents of the complexity approach argue that, because of the complexity of the social our models could not possibly represent it accurately without being 'at least as complex' as the object of discussion (i.e. society) (Richardson *et al*., 2001a, p.9). To put this differently, a theory of everything must contain within itself an account of itself as a theory of everything. This is an impossibility given that to achieve this feat would require an infinite amount of resources to retain an infinite number of theories of everything, over infinite time horizons within a single model, when the availability of resources (such as the physiological capacity of humans to store memories, as well as other physical and temporal capacities) is limited (Webb, 2005, n.36 p.236). Instead we must accept that any attempt to model a complex phenomenon will act to distort the observation (Cilliers, 2005a, pp.608-609; 2007, p.161), while also accepting that we must make models to offer any kind of analysis at all (Cilliers, 2001, p.138; 2008, p.48). In recognising the unavoidable limits of its explanatory capacity (Cilliers, 2002, p.78; 2005a, p.607), the complexity approach instead opts to not oversimplify the relations it attempts to model in situated circumstances, thus it takes account of emergence. The complexity approach can therefore be distinguished from scientific reductionism in that it is self-critical of its own reductionism; it recognises reduction as an unavoidable consequence of the incompressible complexity of social reality (Cilliers, 2002, p.78; 2005a, p.607). It does not aspire towards reductionism, as is the case for the scientific method, it simply accepts the fact of incompressibility and necessary reduction (Cilliers, 1998, pp.1-2; see further Richardson, 2005).

Conversely, although it has been argued that 'the autopoietic environment is always more complex than the system' (Philippopoulos-Mihalopoulos, 2010, pp.68-69), this is only a recognition that the individual, functionally-differentiated sub-systems of society are less complex than the overall autopoietic social environment, and similarly that society continues on outside autopoietic society. The autopoietic approach, while acknowledging that the act

of modelling society as autopoietic reduces the complexity of the account offered, it does not act to mitigate the effects of this reduction. This is revealed in the totalising nature of the specific accounts offered by each sub-system of their particular field; for example, within the autopoietic legal system it is argued that all that is to do with law is contemplated within that system (King, 1993, p.223; 2009, p.72; Luhmann, 1989, pp.141-142; 1992a, pp.1427-1428; Philippopoulos-Mihalopoulos, 2010, p.88). This implies that the boundaries drawn for the purposes of analysis in autopoiesis are not based on consideration of resources, but merely on the methodology (functional differentiation) used to create them. Moreover, while the legal system may continue on outside of autopoietic society, the claim is that functional differentiation provides an accurate representation of that system, such that the autopoietic representation becomes the *de facto* real representation (made more so by the construction of the *real* social, within the autopoietic social!). It appears that the acknowledgment in the autopoietic approach of the reductive nature of modelling, which must form a part of an anti-reductionist position, is superficial. Internally, the autopoietic approach offers complete accounts of its sub-systems, such that the reductive nature of functional differentiation is not considered (Ruhl, 1996, n.4 p.852 and pp.901-906).

EMERGENTISM

As I have said, an approach which possesses anti-reductionist qualities is also likely to display emergentist characteristics. Thus, both the complexity and autopoietic approaches make use of emergence, although it is more clearly acknowledged and significantly more developed in the former than the latter. The complexity approach to boundary is emergent because it does not merely mark the limits of the system's function, but is instead 'both a function of the system and of our description strategy' (Cilliers, 1998, p.4; 2001, p.141). In this formulation, the boundary is viewed as being comprised of the interactions between the system, the observer's attempt to delineate the boundaries of the system, and other elements

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in the environment of the system and the observer. Consequently, the nature of the boundary cannot be derived simply by comparing the various propositions for the location of the boundary and averaging them (recalling the problematic linearity of $c + k = do$). Conversely, autopoietic systems determine the boundary internally, as a self-production. The external observer has a role in defining what they wish to investigate, but this account does not play a direct role in the understanding of boundary generated by functional differentiation; there is no link between system and observer over boundary production. Instead, the emergent quality of autopoietic systems appears (unsurprisingly) to be an internal one. Autopoiesis makes use of a different term to describe emergence though, self-organisation. As the system generates communications about events it encounters it is compelled to organise them into some coherent account of self in order to continue to deal with further events and communications. The system identity which comes about through these self-organising processes is arguably an emergent one, although it is not something which appears to be discussed in the literature on autopoiesis. This may explain why the generation of an emergent identity in autopoiesis appears to be incidental, an accident.

The central criticism offered by the complexity approach on the basis of emergence in relation to the autopoietic construction of the boundary is that the emergence found therein is incidental. The character of the system as a whole appears to be brought about by the piling up of more and more communications. This is merely the accumulation of information (see King and Schütz, 1994, p.270) and does not consider the emergent consequences of the interactions between these communications as the constitutive elements of the system. While Maturana and Varela argue that an autopoietic system can be defined as 'a composite unity' (Maturana, 1980, p.29 in Mingers, 1995, p.15), this only suggests that the collection of parts makes the whole. Although interaction is mentioned in the definition of the system (Maturana 1978, p.32 in Mingers, 1995, p.14), this is not conceived of in the same way as

complexity theory. The sole purpose of the interaction is to make more of the participating parts, not to create new entities and characteristics distinct from, and perhaps not even present, in those parts (see Mingers, 1995, p.15, *cf.* Vermeule, 2012, p.9). Proponents of the autopoietic approach instead state that the system is everything which is not environment. Thus the environment is both the system's 'negative correlative' and 'a contingent state of the system' (Philippopoulos-Mihalopoulos, 2010, p.80). The first element here suggests that the system can be defined simply by subtracting system "*s*" from environment "*e*" to derive the boundary "*b*" (*e* - *s* = *b*). The second element confirms this suggesting that what is currently environment could become system, and what is system could become environment. This in essence treats the system as simply the sum of its parts (communications), which are themselves only part of the broader whole of the environment.

If the autopoietic system is to be derived from the summing of its parts then the autopoietic environment also possesses this characteristic. The premise of functional differentiation is that it is possible for the autopoietic account to deal with every niche of social existence (even if this requires further differentiation) totally. Thus, were one to gather all social communications, one would theoretically have a full autopoietic account of the social (acknowledging that this account operates only from an autopoietic perspective and therefore only offers one account of the social as a whole). There is no question of whether communications might interact at the level of the social environment because communications originating in different systems cannot communicate with one another. This returns me to the conclusion that the existence of emergentism in autopoiesis is incidental. It occurs internally to the extent that the identity of the system might be said to emerge from the collection of communications, however it is not addressed in this way in the literature. Even if it were, this would not appear as emergence from the perspective of the complexity approach because other elements of autopoiesis suggest that the system's boundary can be

derived by examining what is not system ($b = e - s$). However, as I said, it appears that the literature simply does not comment on the notion of emergence. Thus, rather than a flaw in autopoiesis, the absence of emergence could be treated more positively as an unexplored absence.

However, functional differentiation presents a problem here. The legal system's understanding of the social as a whole is limited by and to its functional understanding; function defines what is included and excluded from the system by the boundary (Luhmann, 1989, p.141). Relatedly, society, understood as an autopoietic system, must only be able to understand social interaction in a limited number of ways (those permitted by functional differentiation). This would continue to be the case even if society were to differentiate itself in new ways. This seems to be the epitome of reductionism; the deliberate (as opposed to coincidental) limiting of variables which fall to be considered. The solution is simply to extend the notion of emergence from the system's internal account of itself (where the collection of communications is viewed as interactive leading to an as-yet unaddressed emergent quality to the identity of the system), to the differentiation of society. The precise means for achieving this must almost certainly originate in some form of inter-system interaction, which is problematic for autopoiesis, but perhaps not insurmountable. Regardless, the answer to that question is the subject for another paper.

Each approach demonstrates a degree of anti-reductionist and emergentist sentiment; however, these features are, of course, significantly more developed in the complexity approach. Thus, the critique the complexity approach offers relates to the under-development, and under-investigation of these ideas in autopoiesis. The approaches lead to differing ways of constructing the boundary in each instance. For complexity, the boundary must be the emergent product of interaction between the observer, system and environment. For autopoiesis, the observer is somewhat irrelevant (although they are free to construct their

own autopoietic account of the system, it simply does not interact with the system's own account), instead the system constructs its boundary internally. It was argued that the identity (the boundary) which arises could be thought of as emergent, but other elements of autopoietic thought on boundary construction appear to block this proposition. Nonetheless, it was suggested that the incorporation of consideration about emergence into autopoietic thought is possible.

INTERFACE

Each approach envisages a different purpose for the boundary. While the natural role of any boundary is to distinguish one thing from another, the boundary can also take on a role in relation to how it contributes to a system's attempts to deal with the environment. There is clear difference between the two approaches in this regard which builds on the previous observations made of each. I argue that the complexity approach views the role of the boundary as a flexible facilitator, intended to distinguish one thing from another but not in a confining way. Conversely, the autopoietic boundary adopts the role of filtrator of noise, casting the boundary as an internal lens which ignores (indeed, is blind to) that which the system considers irrelevant, creating the space for the self-construction of relevancies within itself.

The complexity understanding of the boundary as flexible facilitator stems from two characteristics of the boundary, that of the boundary as interface, and of the boundary as being spatially ambiguous. Cilliers has suggested that the behaviour of the boundary as interface is somewhat analogous to that of an eardrum. The eardrum is a boundary which separates the inner and outer ears while also permitting the conduction of the sound waves, yet in its absence 'the sound waves would not be able to get through at all' (2001, p.141).

Thus, the boundary as eardrum facilitates the interaction between environment and system. If some other form of boundary was present, or equally if there was no boundary at all, there would be no method to interface the system with its environment. Here the boundary is central to the interacting relationship between system, environment, and other systems therein.

The boundary is also spatially ambiguous. By this I mean that the boundary is a contingent, emergent outcome of the interaction between the system's understanding of boundary, that of the observer, and that of the environment (or some mixture of these interacting parts) (Cilliers 2001, p.141). Whereas the eardrum analogy suggests a fixed boundary this is not the case. Instead, boundary position varies depending on context, rendering what is internal and external to the interface open to contestation based on observer/system context. If the position and character of the boundary is ambiguous, then it is theoretically possible, and indeed plausible, for multiple boundaries to overlap and intersect within and across perceptions of systems (Cilliers, 2001, p.142). Furthermore, because the existence of the boundary is premised on interaction, and because complex interaction implies the need for a richly interconnected collection of parts, this suggests that the distance between any given part *inside* a construction and the outside is likely to be short (Cilliers, 2001, p.142), while also being indeterminate. We can think of the boundary as being 'folded in' to create these short routes, 'or perhaps the system consists of boundaries only' (Cilliers, 2001, p.142). There may be overlap, intersection, and sharing, and there will always be interaction that must be mediated by the emergent, contingent interface that is the boundary. This account of boundary views it not as a device to separate and segregate systems, observations or explanations, but as being *constitutive* of the system and one's explanations of it (Cilliers, 2001, p.141).

In view of this, the unfixed nature of the boundary in the complexity approach might be thought of as being a multiplicity of boundaries situated in unique contexts borne out of the system's interactions with many different observers, systems, and aspects of the environment (again see Cilliers, 2001, p.142). For law this results in the possibility of many overlapping, intersecting notions of boundary, none of which can be defined as objectively correct. These overlaps appear both practically in appeal court rulings which produce multiple judgments, yet also less tangibly in academic debates about the scope of law and legal inquiry (for example, what is sovereignty? What is legitimate constitutional authority? How do we identify a human right?). I noted earlier that the system might be thought of as just boundaries, this seems partly accurate. It might be more appropriate to say that the system can be thought of as many competing definitions of its boundary (*cf.* Luhmann 1992a, p.1426). What these competing understandings of boundary offer is the possibility of engagement, of interface between differing accounts by varied observers (see Cilliers, 1998, p.120). Thus, the spatial ambiguity of the system's boundaries under complexity theory turns out to be another aspect of its facilitating character. The boundary acts as an interface allowing the production of individual interactions between observer and system, of many interactions between observers' differing accounts of the system, and of the on-going interaction that these interactions themselves generate (*cf.* Luhmann 1992a, p.1419). As with the eardrum, in the absence of the boundary acting as facilitator the complexity approach argues that none of this would be possible.

The autopoietic approach also suggests that the boundary performs a facilitating role, but it does this through a different series of actions; hence the argument that it filtrates rather than facilitates when compared with the complexity theory approach. Whereas the facilitating action permits the boundary to link up components such that they can engage with one another, without preconditioning either of the positions, the filtration action of 'separating

and connecting' (Philippopoulos-Mihalopoulos, 2010, p.46) implies a more active involvement in joining parts of the system together selectively through 'preferential interactions' (Maturana, 1980, p.29 in Mingers, 1995, p.15). This is the consequence of the internally constructed nature of the autopoietic boundary; the system accepts no 'external determination nor, of course, any external delimitation whatsoever' in the construction of the boundary (Luhmann, 1992a, p.1425). In the case of the legal system, the law defines its own boundaries through the recursive application of its communications to further communications (Luhmann, 1989, p.142). Thus, the legal system separates and connects communications by defining what is and is not law for the purposes of constructing the system's boundary through the process of recursive application of communication to communication. The internality of this activity should not be forgotten either. While the legal system translates 'whatever is out there… into whatever can fit in here', that information was always 'latently already in' the system (Philippopoulos-Mihalopoulos, 2010, p.88). This is an act of 'internal crossing', which the system constructs itself (Philippopoulos-Mihalopoulos, 2010, p.81; see also Luhmann 1992a, p.1432). Thus, the boundary as filter is not positioned between the system and the external environment, but within the system between system and the system's imagined reconstruction of the external environment.

While both approaches suggest that the role of the boundary is to act as an interface between system, environment and observers, the way in which the boundary conducts this engagement differs significantly. The autopoietic approach argues that the system's boundary is determined solely by the system (although the appearance of the choices it is presented with which lead to such a construction may be outside of its control). Indeed, Luhmann argues that a system which does not know its own boundaries is not really a system at all (Luhmann 1992a, p.1419) Conversely, the complexity approach views the production of boundaries as

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the consequence of many interactions, and holds that the vast majority of the outcomes of such interactions are far outside of the system's own control. One approach offers relative certainty (internally) about the shape of the system, whereas the other appears to result in the conclusion that there is no singular "system" at all, but understandings of system boundary.

It appears we are being offered either predictability of uncertainty, but this is not quite correct. Complexity theorists have suggested that a more appropriate conceptualisation of the 'interface' (Cilliers, 2001, p.141) between context and understanding requires one to 'fake positivism' (Richardson, *et al*, 2001a, p.16; 2001b, p.44) at appropriate times; when 'we are forced to take a position' (Richardson, *et al*, 2001a, p.16). This means that reasoning must be conducted through an ostensibly objective framework even though both one's use of it, and its products, will be provisional and local (see Webb, 2005, p.231). For example, in order for legal judgments to be actionable we have to act as if they are objective. While a judge may offer a clear and comprehensive judgment, this can only ever be a concrete description of the law *in that specific context*, from the judge's own perspective. In all other contexts, for example in the application of the ruling, or the interpretation of the precedent's meaning to future cases by subsequent advocates and courts, the meaning will change. Acceptance of this is significantly aided by the formalisation of the legal process, because it establishes a framework in which to conceptualise disagreement broadly understood by most participants in the system, and which remains actionable because we all follow it.

Therefore, the complexity approach does not promise predictability (Cilliers, 2005b, p.256; Heylighen *et al*., 2007, p.130, Preiser and Cilliers, 2010, p.269), it orientates itself to expect disagreement, disunity, and a need to negotiate the boundary (Cilliers, 1998, p.120). This is almost certainly a more appropriate representation of the overall character of boundary construction in the social environment as a whole. While the system under a complexity approach might construct its *own* idea of boundary following autopoiesis, that method is not

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sustainable beyond the internal thoughts of the system, or observer. Beyond the system (to the extent that we can even think of there being a single system, or a beyond (Cilliers 1998, 4; 2001, 141; Richardson *et al*. 2001a, 9, 2001b pp.63-64)) interaction seems to be the only feasible way of taking a system forward, of getting anything new into the system and generating further energy. Thus, the role of the boundary as filtrator in autopoiesis is important, the system needs a way to decide what it will and will not pay attention too (be this internally constructed or otherwise). However, from that position it then must facilitate something more than just the separation and connection of internal parts and internally imagined externalities. Structural coupling in autopoiesis, initially 'conspicuous by its absence' (Mingers, 1995, p.147), represents an acknowledgment within the self-referentially orientated framework of autopoiesis that interaction is an unavoidable necessity in society. Yet the tool itself is hampered by the internally orientated construct within which it operates. Conversely, the complexity approach of facilitating interconnection and interaction between the system, observers, other systems, and the environment generally, offers a significantly more effective (and less conceptually awkward) means of interfacing and interacting parts. However, acceptance of this element must entail recognition that contingency and emergence, as imagined by the complexity theory approach, have a part to play in the construction of boundaries.

CONCLUSION

In closing I want to make some remarks about what the complexity approach offers to autopoiesis, and the separate utility of the complexity approach to systems theory thinking in law. I hope it has been clear that I did not intend to orientate my critique towards any particular "school" of autopoiesis. However, it is not targeted at the theory's more orthodox supporters against whom many accurate, but by now well-rehearsed, arguments have been

made (dealt with in King, 2001). My argument rests on the understanding that there is something in the character of autopoietic theory generally which a complexity approach can comment on. This is perhaps most appropriately described as a difference of ethos which I have argued is manifested in the portrayal of the boundary.

The complexity approach to the boundary as a contingent, emergent, interface, and therefore as a somewhat unquantifiable, uncertain phenomenon which appears to exist in many varied contexts simultaneously presents something useful to autopoiesis. At present, the autopoietic approach is heavily reliant on self-construction, and self-reference. While this approach *may* be appropriate when considering an individual system from a single, isolated perspective (indeed, it can be a highly effective analytical tool), it is insufficient on its own beyond this. The understanding of boundary entailed in the complexity theory approach demonstrates that when one expands consideration to either multiple understandings of a system between varied elements of that system (because neither autopoietic nor complex systems are internally uniform), or to the effects brought about by the interaction of individual understandings of boundary between differing systems (for example, a law as proposed by the legal system and experienced by the health system), the autopoietic approach is not enough. In either example, the effect of the presence of multiple perspectives needs to be worked out, but this is not achievable within the autopoietic approach. Each has an understanding of what it thinks this is, but this is isolationist, reductionist. What is needed is a means of explaining what might be the product of those two understandings interacting; this is what the complexity approach offers legal autopoiesis.

For law, and legal systems theory thinking, complexity theory therefore offers an alternative to the autopoietic understanding of systems. The very understanding of "system" has been shown to vary between the two approaches. In autopoiesis the legal system is relatively sure of its shape and character, as it is defined self-referentially and constructed internally. The

complexity approach defines the legal system from a different perspective, as a consequence of many competing understandings of its boundary. The orientation of the complexity approach, coupled with the new tools it brings with it (contingency, emergence, interface), offer a tangibly different way of assessing legal constructions (from both an internal and external perspective) to that offered by autopoiesis, or indeed any other approach.

It would be wrong to take from this that complexity theory, a hitherto relatively unknown systems theory, is perfect; the complexity approach recognises the boundaries of its explanatory capacity (Richardson, *et al*., 2001a, p.9). Indeed, complexity theory holds that boundary drawing represents a reduction of complexity by participants in order to form models to make sense of the world (Cilliers, 2002, pp.78-84; 2005a, p.606). In order to express our understandings of the world we have to reduce the complexity of our models (Cilliers, 2002, p.78), and this has the effect of distorting our perceptions of reality (Cilliers, 2005a, pp.608-609; 2007, p.161). Any single account will thus miss out elements of the whole, due to its context, and so present a distorted, limited picture.

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Notes

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[1] It is important not to conflate Luhmann's use of the word complexity with that of complexity *theory*. Complexity theory is a systems theory independent of autopoiesis, which actively distinguishes between complexity and complicatedness. Something is complicated when there are a great many parts that fulfil a particular function when they are connected together in a specific way (for e.g. a jet airliner or a 10,000 piece puzzle). Conversely, something which is complex, or which displays the characteristic of complexity, possesses a great many parts which *interact* with one another in a multiplicity of ways. The character of the whole is not derived from the parts' individual characteristics but from the emergent properties that become apparent only through their interaction. Therefore, although Luhmann has discussed "complexity," and associated notions such as contingency (see Luhmann, 1985, pp24-31) this was not complexity *theory* and appears more akin to complicatedness as the 'progressive accumulating' of parts (King and Schutz, 1994, p.270).

[2] On knowledge and information in complexity theory see Cilliers, 2002, p80. On the contingent construction of meaning see Webb, 2005, note 19 p231