Revisiting Autopoiesis: A Research Note and Another Narrative on Accounting and Sustainability[1]

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ABSTRACT

Purpose: This relatively short paper offers a more developed interpretation of the continuing and worrying trend in which "sustainability" is either ignored or implicitly assumed to be part of – and compatible with – notions such as eco-efficiency, growth, profit and the business case.

Design/methodology/approach: The essay employs the theory of autopoiesis as a metaphoric lens through which to re-examine accounting, business and educational practice with respect to sustainability

Findings: The theory of autopoiesis works well as a lens in this regard and the analysis succeeds in highlighting that the accounting, business and educational systems may well be protecting their "cores" but are doing so by ignoring crucial and life-threatening information. In autopoietic terms, the sub-systems are behaving psychopathically.

Originality: The paper brings together a scattered, although substantive, literature in and around autopoiesis and offers a relatively novel narrative about humanity's (non)engagement with sustainability

Keywords: Autopoiesis; sustainability, learning; accounting for sustainability; reporting, accounting profession, accounting education

Paper type: Research note

1. Introduction

As Llewellyn (2003) so thoroughly demonstrates, theory is still only poorly understood in the social sciences despite the very wide range of functions that it serves in our intellectual life. Theories, she argues, operate at many different levels of resolution, "*impose cohesion and stability"* and "*are used whenever people address ambiguity, contradiction or paradox so that they can decide what to do (and think) next. Theories generate expectations about the world"* (p665). Indeed, she emphasises, theories are the very essence of how we "see" the world and make any sense of it; reflecting and reflected in our world views and directing our attention to that `which matters' whilst, consequently, removing other matters of `less importance' from our gaze and cognition.

Autopoiesis is, stated simply, a theory which posits systems as autonomous, self-reproducing entities interacting with a wider context and distinguishing between benign and threatening forces acting upon it. The theory appears from time to time in the accounting literature and we are keen that it should not join the dusty shelves visited by academics shopping for a theory (Llewellyn, 2003). It has successfully raised powerful insights into accounting, modernity, business and the profession (Lee, 1990a; 1990b; Laughlin and Broadbent, 1993; Power, 1992; 1994; Birkin et al.,1997) and it offers another helpful alternative in the landscape of theorising. In particular, autopoiesis offers an apposite lens through which to try yet again to articulate what appears to be a quite riveting resistance to the exigencies of sustainability. This paper does not argue for any one view of sustainability but, by contrast, suggests that only (typically) business-as-usual articulations of sustainability are permitted into discourse and that plurality and debate is silenced. It is to clarify that silencing and to argue for a more open and learning approach that this research note has been written. It is our hope that the paper may contribute to the literature through encouraging wider use of the lens of autopoiesis and, especially, that we may add a more powerful metaphor to the frequently flaccid discussion in and around sustainability.

The paper is organised as follows. The next section briefly introduces autopoiesis and some of the key issues that arise when we bring an essentially biological theory into the social sciences[2]. Section 3 reviews the relatively slight but genuinely rich use

[2] The issues are considerably more diverse and complex than we represent them here and we make sure that additional references to that complexity are available to the interested theorist.

of autopoiesis as a lens in accounting research before section 4 looks at how "sustainability" might be understood in this context. Section 5 comprises the heart of the piece where we re-examine the accounting and sustainability initiatives through the lens of autopoiesis. The results are not encouraging. Section 6 briefly explores how, if anything, those committed to diversity and sustainability might respond to our inferences.

2. Introducing Autopoiesis: From biology to social science

The theoretical lens offered by autopoiesis was probably first introduced to accounting by Lee (1990a, b), Robb (1991), Power (1992; 1994) and Laughlin and Broadbent, (1993). Despite its potential, the lens has not, as far as we can tell, occupied a place of any prominence in the accounting literature since, (a matter to which we return later).

The word *autopoiesis* means self-production and, broadly, refers to the capacity of systems to be self-maintaining and self-reproducing. Mingers (1989) defines it as:

".. a living system… which is organized in such a way that all its components and processes jointly produce those self-same components and processes, thus establishing an autonomous, self-producing entity" (p162)

As Niklas Luhmann (1986) emphasises, autopoiesis is initially a biological theory and was originally developed to study the nature of living systems (Varela, 1981). Its core concepts are cybernetics and the neurophysiology of cognition (Koskinen 2010). As such, the translation of a biological theory to the social sphere must be managed with considerable care (Mingers 1989).

At its simplest the theory posits a series of interacting and mutually constitutive systems. In essence, each system maintains its boundaries in order to distinguish forces from outside those boundaries that it considers benign or threatening. It is the ability to embrace benign influences (e.g. food, energy) that allow the system to maintain itself and reproduce whilst defending itself against malign influences that might threaten it (e.g. destructive viruses or other aggressive systems). (See, for example, Vanderstraeten 2005; Maturana & Varela. 1973; Maturana, 1981; and Koskinen, 2010).

In the biological context, as Maturana (1975) and Varela (1979) (amongst others) have illustrated, the theory becomes very significantly more complex and much more demanding in the precision required for the definition of the elements of the theory – specifically around (what they maintain as) `organisation' and `structure' of the relationships, components and properties of the system. (As we shall see below, the elements of organisation and structure resonate strongly with Giddens' notions of structure and systems). It is this, sometimes disputed, complexity coupled with the *a priori* caution that must accompany any attempt to apply a life sciences perspective in a social sciences context, that has occupied a great deal of the literature around this area (see, for example, Robb, 1989; 1991; Mingers, 1995).

The initial translation of autopoiesis into a social context is normally attributed to Luhmann in the 1980s (see, for example, Bednarz, 1989). Seeing society as a series of systems in which each system was less complex than its environment (resonance with Ashby's Law of Requisite Variety here[3]) and focusing on an essential capacity of complexity Luhmann (1989) introduces the crucial notions of communication, information, difference, coding and programmes. Communication between systems and between sub-systems must, Luhmann argued, be simplified. This is achieved by a binary code of *difference*: distinguished by that which refers to the system and that which does not (legal, illegal, for example). Information is, therefore, determined by the system itself and "Coding and the programs that accompany it (theories in science, laws in the legal system…..) produce a sharp reduction in what is information" (Bednarz, 1989, p. xiv). So, crudely, each system can be thought to be embracing and reacting to that information which *codes* to it and ignoring and rejecting that which does not *code* to it.

The attraction of the theory to social scientists is expressed neatly by Jessop (2001):

An autopoietic system is self-constituting in so far as it defines and defends its own boundary vis-à-vis its self-defined external environment. It is also self-organising because it has its own distinctive operational codes and programmes. Hence, while an autopoietic system may respond to changes in its environment and even change its organisation in so doing, it does so in terms of its own codes and programmes (p217).

[3] W.R. Ashby's Law of Requisite Variety essentially suggests that control of an organism/organisation requires that the control function has available to it a range of responses equal to the range of perturbations that the environment may present. More formally that "only variety can destroy variety" (Ashby, 1956).

Amongst the key issues that faced scholars as they attempted to wrestle with the undoubted attractions of a theory which can postulate a notion of systems which are simultaneously open *and* closed, were those lurking doubts about whether social systems can be autopoietic (Mingers, 1995) and how much of the scientific functionalism is inevitably imported with a life-sciences theory, (Robb, 1991). The functionalism is a part of the standard critiques of systems theory more widely (Hopper and Powell, 1985). It is overcome, in part, by the introduction of political, educational and ethical systems and human agency and, in part, by adopting a "soft systems thinking" (Otley, 1983) in which the systems concept is a metaphor or heuristic which, much like Robb's "virtual autopoietic system", directs attention and raises issues but does not seek to purport to precisely represent the elements of the theory, (Robb, 1991). It is in this sense as a heuristic or metaphor that autopoiesis is employed in this paper, (see especially Morgan, 1986. See also Tsoukas 1993; Llewellyn, 2003; Gray et al, 2010)[4].

The theory of autopoiesis has been used outside the biological sciences extensively in organizational (for example Goldspink and Kay 2003, Radosavljevic 2008), political economy (Jessop, 2001) and systems and cognitive information systems' research (for example by McMullin and Varella 1997; Bourgine and Stewart 2004; Dittrich, Ziegler and Banzhaf 1998). It is perhaps best known – aside from Luhmann's attempts to re-imagine society – in Tuebner's work on the relationship between the law (as an autopoietic system) and society (Teubner, 1987) but it perhaps remains a moot point whether autopoiesis is more properly seen as a theoretical frame all unto itself or as one part of the suite of approaches to systems thinking and the employment of biological metaphors[5]. In fact, to what extent, are heuristics pragmatic and conditional choices? This point becomes more apparent when we address the use of autopoiesis - and its derivatives - in accounting

[4] According to Koskinen (2010) autopoiesis has been specifically defined and applied only to systems whose physical boundaries can be defined precisely and in the field of information technology and computational mathematical modeling. As far as human social systems are concerned there is an added complexity that goes beyond physical environments into an inner world of concepts, ideas, symbols, human thought, consciousness and language that define human social systems and expand the context of the domain to include the social domain (p48).

[5] Indeed, exploring this theorising suggests very strongly the inter-twined nature of many theories. We have briefly referred to the putative connection with Giddens' structuration theory; the link with general systems theory and thinking is obvious; the theory reflects much of the same well-spring as we find in Habermas (Power, 1992) and the spore of ANT is also quite clear here.

3. Autopoiesis in Accounting

The first employment of autopoiesis in the accounting literature, of which we are aware, was that by Lee (1990a, b). Lee offers a powerful history of accounting as one in which a steady increase in complexity has had the effect of increasingly insulating the craft and profession to an ever-greater degree from both organisational and societal changes. He employs the autopoiesis metaphor[6] to argue that the core of accounting has, almost entirely, remained unchanged as a *"…written system of abstract accounting representation requiring an education-based expertise…"* (1990b, p101). He goes on to argue that the apparent responsiveness and increased complexity of accounting has, to a considerable degree, been a process of protecting and insulating the core from change. He offers his analysis as evidence – and explanation - of the inability of accountants *".. to innovate significantly in accounting"* (1990b, p94). The essence of his argument is that, having reached an autopoietic state, (which has, of course, the status of maintained hypothesis) the:

"…professionalised world of accounting as a system is being selective with respect to change – that is, accepting change that does not alter the autopoietic state, and rejecting change that has the potential to do so" (Lee,1990a, pp246-7).

He continues and draws an arresting suggestion that the role of research in accounting is to maintain the appearance of response and change but only that research which accords with the core is ever seriously addressed. The potential parallel with research in (particularly) accounting and sustainability is striking and a matter to which we return later[7].

Robb (1991) uses very similar words when offering accounting as an example of a probably autopoietic social system:

"..[w]ithout a sound theoretical footing and, in the eyes of some, fatally flawed, accounting appears to be organizationally closed, capable of adapting itself to its rapidly changing environment, and probably well-able to engulf many of the alternative ways of representing activities in society" (p215).

He goes on to suggest that:

[6] And thereby, echoing Robb's arguments, avoids the need for a precise definition of the components, boundaries and relationships of the system "accounting" that the original biological theory demands.

[7] There is a potential tautology in this argument in that what is and what is not the core of professionalised accounting is not a fully specified set. Therefore that which is rejected might be inferred to be a challenge to an unidentified core. This is the sort of causal flexibility that so concerned Mingers and Robb as we saw earlier.

The practice of accounting… is rigorous and rule-following, while such conceptual structures as it has, are fluid and highly responsive to anomalies arising from practice" (p222)

… and offers environmental and resource depletion accounting as one illustration of this thesis. However, the point to be emphasised is that such accounting involves the application of existing accounting frames and practices to a new area – but (typically) exclusively through the lens of both the traditional accounting entity and the traditional accounting principles. That is nothing at the heart of accounting has changed.

Power (1992) similarly employs autopoiesis in the context of environmental issues and, in particular, explores whether accounting is actually capable of addressing "environment" in a way which is sensitive to the natural environment itself. He concludes that accounting, like economics, is a fundamentally autopoietic social system and can only address it through its own codes – it can only "engulf" it as Robb suggested. Power counsels that "a technocratic reworking of existing accounting frameworks" will fail to attend to "the organizational transformations necessary" for the changes which a genuinely environmental accounting envisage and require. His comments are prescient. Power later develops this thesis more subtly (Power, 1994) and, drawing from Teubner, suggests that accounting is not so much an economic medium *"… but rather the medium between the economic environment and the organisation"* (p375) and, as such, is a principal filter for environmental disturbances that may challenge the core and codes of the organisation (the company typically) in question. It is through this lens that Power offers different possibilities for accounting and the environment that encompass (if we can permitted a degree of simplification) two extremes: that the accounting will "engulf" the environment or that "accounting for the environment" needs to side-step the accounting professionalised system altogether and develop independently – much as standalone reporting has done in fact. The middle route Power notes involves challenges to the accounting core through the use of rationalised accounting concepts such as "capital and natural capital". Again, there is great prescience here: accounting as a core professionalised system does not like to entertain aspects of society and the environment that cannot be coded into the core notions of "assets", liabilities", "costs", "profits" etc..

Birkin et al.'s (1997) use of autopoiesis is briefer and more broadly-based than Power's but points to the same basic issue: that unless the core of accounting can be adjusted and significantly changed it will be unable to embrace the demands of

sustainability and be unable to adapt and survive in this new sustainability-orientated world. Birkin et al., as other writers, have seen the self-protection and reproduction of accounting as part of a fundamental problem. That is, it is the very conservatism of accounting which is attracting the analysis and, interestingly, the charges of conservatism that critics levelled at autopoiesis as social science theory are providing the basis for a critical assessment. Autopoiesis may very well be a fundamentally conservative theory but it has shown its worth as a metaphor for social conservatism in places where such conservatism ill-suits humanity.

Indeed, what is striking is that the use of autopoiesis in accounting is typified by this general sense of conservatism, (see also, Garseth-Nesbakk, 2011; Hikaka and Prebble 2010; Seal 2001; and Cooper, 1995). It is perhaps apposite to remind ourselves, though, that the innate conservatism of autopoiesis should not be taken to necessarily imply innate rigidity. It is arguable that perhaps there is a tendency in the heuristic use of the theory to simplify the theory's notion of closeness and to assume that perturbations *can* be ignored and that learning and change *cannot* happen. The essence of the theory as a biological framing, sought to explain adaptation and survival and, despite the potentially heuristic application of autopoiesis in accounting and social science, it must be recalled that for the theory to have insight there needs to be some (social) assessment of which perturbations are potentially good for the system and those which are not: and, more importantly, whether the (autopoietic) system itself is good for the host society or not.

Equally, as Gudemmi (2000) points out it is the organization of the autopoietic system that stays consistent whilst the structure of the system changes through structural coupling. The autopoietic system needs to undertake such coupling for its survival especially if it is a part of a larger structure or organization. And herein lies an essential tension that is, in all probability, perception-biased. Has accounting the capacity to change in order to survive or (as most of the authors referred above suggested) is it the organization of accounting itself which is potentially malign to wider social, environmental and sustainability concerns? (This is a matter we examine more carefully in Section 5 of the paper).

Of course it is not necessarily one or the other – and equally the degrees of capacity for adaptation and change and the nature of that change remain contestable. This is a matter that Laughlin (1991) seeks to address[8]. Laughlin draws in some detail from

[8] Laughlin (1991) makes no direct reference to autopoiesis but the influence of that framing is clear – especially in the way he draws from Robb's work.

the work of (*inter alia*) Smith (1982) and Robb (1988) as well as from the work of Habermas to derive a model of organizational change/no-change as a metaphor for the postures it might adopt (in a purposive manner) in the face of external stimuli, `jolts' or `disturbances'. The organization might adopt a posture of no-change ("Inertia"), of first-order (*morphostatic)* change or of second order (*morphogenetic)* change. Inertia is self-explanatory as a "do-nothing" strategy. The other notions are defined: *"Fundamentally, morphostatic change involves 'making things look different while remaining basically as they have always been'"* (Smith, 1982, p318) whereas *morphogenetic* change occurs when *"the model of the organization held in view is questioned, when, as a result of learning and development processes, a new model emerges and when new processes are instituted to achieve the new objectives entailed by the new model"* (Robb, 1988, p4).

These definitions are helpful to a point but, as we have seen with the model of autopoiesis itself, they do not empirically clarify what first and second order change might look like and whether we could distinguish them in a purely empirical sense. It may well be that the categories *are* perception/worldview dependent and what a conservative sees as second order change, a more radical mind would see as first order.

Laughlin then developed the model to identify finer grained responses at what he saw as the first and second order change levels. Central to the model as Laughlin perceived it was an assumption that external pressure to change against the organization's (i.e. the organism's) innate coding should normally be seen as "a bad thing" – that colonization would not be in the interests of the organization and the processes of evolution would raise questions of desirability or otherwise. This imposed a potentially conservative bias in the model that becomes more important when one is confronting stimuli which are self-evidently important to the meta-system (e.g. society or the natural environmental) but it is not obvious that such stimuli will be in harmony with the organisation's own sense of self-replication. In precisely this context, Gray et al, (1995) expanded the model slightly to emphasise that levels of adaptation that produce new and different systems – more evolved and environmentally-sensitive business typically – may, actually be forms of resistance to the key part of the stimuli – that the organism should either be destroyed or change beyond any reasonable recognition. Crudely, the issue is whether a business can change to the point where profit-seeking, shareholding dominance and growth (for example) are no longer parts of the organisation's design archetype. This distinction is shown in Figure 1.

Figure 1: Laughlin's typology of organizational change adapted by Gray et al (1995)	
No Change	(i) Inertia
First order change (Morphostatic)	(ii) Rebuttal (iii) Reorientation (iv) Colonization (v) Evolution
Second order change (Morphogenetic)	(vi) Colonization (vii) Evolution

In broad terms the point to be made was that disturbances such as changes in law requiring an organisation to take responsibility for its waste and packaging (for illustration) cannot be ignored, do not easily fit the organisational modus operandi and consequently require a great deal more from the organisation than a simple reorientation. Similarly the emergent changes necessarily allow an effective environmental management system to develop and the changes that the EMS will wrought might be thought of as more than a simple reorientation. From the organisation's perspective these changes may seem to be of a second order nature. However, such changes (we would argue) do not, in any essential way change the relationship that the organisation has with waste, or with the local communities or with the natural environment, for example. Most obviously in that these matters remain, to the organisation, matters recognised through traditional financial and management lenses – not as issues in their own right[9]. Certainly such changes do not substantively alter the organisation's relationship with the holders of capital, consumers and employees in any substantive way – otherwise the organisation would no longer be a normal capitalist organisation and be something else – a social enterprise perhaps, (Barter and Bebbington, 2010). Such radical changes must, it is argued, be conceivable – however unlikely they might be in practice, (Gray et al, 1995).

[9] Of course, individuals do change their relationships with these matters and then we have the arguments to the extent to which individuals can and do change organisations. This is argument beyond the scope of this paper.

4. An Autopoietic View of Sustainability and "sustainability"

Initially at least, it is perhaps no great surprise that a substantial proportion of the literature exploring autopoiesis should use it as a lens through which to examine mankind's engagement with the natural world. The biological roots of the theory, just like those of General Systems Theory, seem to automatically direct our attention to such matters and bring us face to face with the probable inherent contradictions between natural systems and the hyper-reality of economically derived systems. Luhmann's (1989) development of autopoiesis in the context of an ecological frame seems both apposite and inevitable.

If society is indeed a system, then, from an autopoietic point of view, it is under considerable threat from the larger natural environment. Of this, there is little doubt - mankind's current ways of living and organising are clearly at variance with usual understandings of sustainable development:

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs… Development involves a progressive transformation of economy and society … But physical sustainability cannot be secured unless development policies pay attention to such considerations as changes in access to resources and in the distribution of costs and benefits. Even the narrow notion of physical sustainability implies a concern for social equity between generations, a concern that must logically be extended to equity within each generation" (UNWCED, 1987, p43)

And almost any engagement with the best data available suggests that current means of organisation fail this test (Meadows et al, 1972; 2005; Millennium Ecosystem Assessment, 2005; United Nations Environment Programme (UNEP), 2002; WWF, 2004; 2008). As the United Nations Millennium Ecosystem Assessment (2005, p2) so cautiously put it *"human activities are putting such a strain on the natural function of the Earth, the ability of the planet to sustain future generations cannot be taken for granted"*

Clearly for society's long term survival it would be beneficial – even essential - for humanity to exhibit openness and learning in response to the perturbations represented by the data and, in all probability, mankind's implication in this increasingly un-sustainable situation. It is not at all obvious that this is happening as

one might expect of an autopoietic system in that there appears to be a substantial danger that society is closing itself off from the openness which would allow it to learn about and from the perturbations produced by current un-sustainability, (Koskinen, 2010)[10].

This is something that Robb (1989) suggests:- society as an autopoietic system has implemented a homogeneous path of growth and production which have in turn developed and nurtured sub systems that reinforce its own ends. The existence, growth and prevalence (dominance and impact) of these sub structures has occurred due to their reflection of what society has increasingly wanted, emphasized and promoted: economic prioritization. This prioritization, itself in turn has led to a situation in which: *"the subsystems of the economy and state become more and more complex as a consequence of capitalist growth and penetrate even deeper into the symbolic reproduction of the life world",* (Broadbent and Laughlin, 2005). The point, as Luhmann so eloquently illustrates, is that the system is developing a self-referentiality which is increasingly economic, focused on production and growth and ever more impervious to perturbations from the natural environment, (Saravanamuthu, 2009; Hahn, Kolk and Winn, 2010; Li et al., 2010). Luhmann (1995) sees society as steering towards an unsustainable path by a combination of general inclination, perception and practices based on economic dominance and measures of success (including accounting considerations) that seek to denominate wealth in purely monetary terms. The system becomes more and more orientated to `business as usual' and incapable of engaging in the essential processes of learning through the development and creation of its own knowledge for both survival and evolution (Koskinen 2010). Optimistically, Vanderstraeten (2005) has suggested that society has recently realized that it cannot be sustained by the physical environment if it maintains absolute closure from these potential data. which, in turn, raises serious and disturbing questions about how society learns and the nature of (what Laurence and Anderson, 2003; call) social cognition: if society does not change its methods of existence and growth based upon the economic imperative then society is a threat to its own survival.

[10] (Koskinen 2010, p51) argues that an autopoietic system is simultaneously open and closed. It needs to be open to attain information followed by closure for self-referencing when the system assesses and analyses the information with a great degree of communication, analyses, and discussion and uses judgment, past experiences and present knowledge in order to undertake action and change.

These analyses are not, of course, uncontested. It is quite apparent that there is a significantly increased use of the term "sustainability" as well as a significant rise in the numbers of initiatives and discussions that appear to embrace "sustainability". To a number of commentators – including those above, such apparent embracing has the nature of first order, morphostatic change: the systems embrace sustainability without anything fundamental changing in the design archetype. For commentators closer to business, the employment of the notion of "sustainability" would arguably appear to feel like second order (morphogenetic) change, (Bebbington and Thomson, 1996)..

This *impasse*, emphasises the empirical weakness in the theory of autopoiesis but, more substantially, throws into relief the differences in perception that debates around sustainability raise – debates which have long been typified as concerned with "weak" and "strong" sustainability (Turner, 1993; Bebbington and Thomson. 1996). Hence we remain caught on the horns of dilemma: how to resolve whether, in some absolute and/or empirical sense, the conversations are about "*sustainability*" or "*sustainability-lite*" when commentators clearly find their own point of view self-evident.

If the strong-sustainability camp is correct then it seems that social cognition requires that individually and collectively we need to refine our design archetype such that the notions of the radical demands of sustainability can be considered and learnt from – not resisted and rejected without consideration. But how this might be achieved remains elusive if there is no recognition that morphostatic change is ***not*** morphogenetic: if engagement with weak sustainability is not sufficient in a world requiring strong sustainability: the same problems that Lee wrestled with when considering the accounting profession.

5. An Autopoietic View of Accounting and Sustainability

From the foregoing it is probably fairly obvious how the lens of autopoiesis will offer a narrative of accounting and sustainability. Straightforwardly, Morgan (1986) argues that: *"[systems] are always attempting to achieve a form of self-referential closure in relation to their environments, enacting their environments as projections of their own identity or self-image"* (p240). In essence, therefore, we can extend Morgan's statement to suggest that "sustainability" will (and can) only be understood by organisations, systems of representation like accounting and educational paradigms

in the terms of that system – not in terms of what may or may not obtain in the larger environment. As Morgan says *"relations with any environment are internally determined"* (p238, emphasis in original). The difference here, however, is that we are not simply adopting the existence of such behaviour as value-neutral: we will want to maintain that any human system that behaves like this when faced with legitimate stimuli is self-destructive or malign: the systems are acting wilfully and improperly. Furthermore, as Richerson and Boyd (2005) have shown, societal systems can play crucial roles in steering society towards sustainability. In this respect they have identified that a sub system observing the adoption of 'harmful traits' in the meta-system (such as the unsustainable actions by other systems and society in general) has an important consideration for change. This is the (optimistic) role that much of the accounting and sustainability literature is seeking.

We want to briefly explore the insights suggested by autopoiesis around three simple themes of: business representation; accounting and professional representation and academic (non)responsiveness. In our view these capture several different aspects of the ways in which the potentially infinite variety of accounts of/for sustainability are constructed and embedded, (Gray, 2010).

Business representation

"We at the World Business Council for Sustainable Development do not like the term `sustainable development'; we prefer the term eco-efficiency" (WBCSD presentation to press in Moscow as part of an UNCTAD initiative, 1996)

Broad business engagement with sustainability might be thought to comprise three elements, these being the way in which: business representative bodies portray sustainability; business commentators' portrayal and, of course, the individual business' own engagement with the term. Each of these has attracted a reasonable amount of academic attention (Gray, 2006; 2010; Laine, 2010; Milne et al, 2003; 2006; 2009; Moneva et al., 2006; Tregidga and Milne, 2006) attempting to illustrate the way in which the notions embedded in sustainability are captured and then employed by the business community.

Avoiding for the time being the contention that it remains impossible to determine conclusively whether the `weak' or the `strong' form of sustainability is that which actually obtains, the issue at question is that *only* those aspects and understandings of sustainability which "code" to the business entity as currently understood can possibly be acceptable.

Thus, autopoiesis will alert us to the realisation that only those understandings of sustainability which accord with eco-efficiency, the business case and codetermined profitability will gain any traction within a business or a business community – the relations with the external environment are, indeed as Morgan suggested, internally determined.

There are two key empirical points in this.

The first is that all of the claims to "sustainability" and the uses of the term made by business and business organisations – especially in their reporting – exhibit *no* demonstrable connection with the data-based components of how sustainability is to be understood at planetary, social and ecological systems levels. This is not to suggest that (say) eco-efficiency *cannot* contribute to a more sustainable (less un-sustainable) world but that the link is elusive and crucially not demonstrated by those making the claim[11].

The second point is that, whether or not "sustainability" and (say) eco-efficiency are compatible, no discourse that suggests an incompatibility is permitted to enter the system. Such ideas do not code to the business system or indeed to profit-centred businesses and so, autopoiesis would suggest, simply cannot be recognised. It simply doesn't matter what sustainability actually means – it can only mean what the autopoietic business system can understand. Consequently, any other, alternative, discourse cannot be given legitimacy by the system. It does not appear as though they are censored in any active way – they simply cannot be recognised. And to the extent that their presence is a nuisance they will be dismissed in any number of different ways to re-code them as `wrong' or `inappropriate' or `insane' in some way[12]. If your interpretation of sustainability appears to challenge any aspect of what the business systems understands itself to be – it cannot be entertained, (Gladwin et al, 1995).

An autopoietic system should, however, be a learning system and the constant bombardment of new information – disturbances in the environment – should, through persistence eventually start to overcome the business-as-usual barriers (Tabara and Pahl-Wostl, 2007). However, this is unlikely to happen if the perturbations are seen as challenging to the core archetype – regardless of their

[11] Of course it is difficult to prove a negative but we remain unaware of any such data.

[12] This comment has very extensive personal experience behind it in that years of engagement in and around sustainability and/or accounting have come almost to nought, shipwrecked on the rocks of autopoiesis.

power or importance. At which point the core archetype is "wrong" and business is indeed psychopathic as Bakan suggests (Bakan, 2004).

Professional and accounting representation

Lee (1990a, 1990b) has already demonstrated a convincing case for the accounting profession being both autopoietic and steadfastly resistant to notions that do not code and, indeed, he draws an arresting suggestion that the role of research in accounting is to maintain the appearance of response and change but only that research which accords with the core is ever seriously addressed. The potential parallel with research in (particularly) accounting and sustainability is striking. Power (1994) takes this further highlighting the technical predispositions of accounting and its consequential inability to embrace the wider, more disruptive forms of (in his case) environmental accounting. Birkin et al (1997) effectively concur with this reading and suggest that any potential that the new forms of environmental accounting have for substantive change must lie in "radical changes in value and practice" (p335). This is something which Robb (1991) would see as highly unlikely.

The point being that the conventional accounting systems (however elusive and bizarre they might be, Lee 1990b) simply cannot recognise and code the more dynamic and adventurous forms of ecological and sustainability-inspired accounts. As Parker (2011) has suggested sustainability accounting research has faced considerable resistance from 'mainstream' accounting research that is based on the traditional model of economics with the profit imperative.

Such an autopoietic lens would offer some explanation for why the substantive and entirely practicable experiments with various forms of accounting for and with sustainability have met such indifference (at best). Various forms of accounting for sustainability (Bebbington and Gray, 2001; Bebbington, 2007; Gray, 1992; Herbohn, 2005; Jones, 2003; Lamberton, 2005; Spence and Gray, 2007) have offered means through which an accountability related to sustainability might be practicably articulated but their impact on practice has been either negligible or non-existent. Only when the suggested method either codes more closely to conventional accounting reasoning and the "business case" (e.g. Howes, 2004; Hopwood et al, 2010) do the ideas gain any traction[13]. Further, one of the authors can speak at length from direct personal experiences in which attempts to challenge the use of the

[13] Albeit the engagement still remains marginal, it would seem until any trace of challenging coding is removed – as appears to be the case with the International Integrated Reporting Committee – IIRC (2011), Gray (2012).

term “sustainability” (most especially – but by no means exclusively) in the ACCA’s Sustainability (sic) Reporting Awards Scheme and the ACCA’s Sustainability (sic) Global Forum) and/or to offer alternative means of accountability for sustainability have been ignored, diverted, ridiculed or emasculated. Even articulations that looked a lot like accounting and drew from many sound accounting principles, suffered the same basic fate (Lee, 1990b). A lens of autopoiesis would suggest that despite their guise as accounting they were recognized in some manner or other as not coding to the core archetype and were again not just refused entry but no attempt to recognize, engage with and/or learn from these ideas was forthcoming. The brilliance of the strategy is that non-coding ideas cannot even be discussed – no debate is given warranty.

And yet, on the surface, there is every appearance that the accounting profession and accounting practice are fully and enthusiastically engaged in all matters sustainable. If use of the term was evidence of engagement then “sustainability” is central to accounting thought and practice in many countries around the world. It is striking therefore that none of this engagement admits to alterative representations and offers no demonstrable evidence of the connection between what we are calling “sustainability” and what the indications of un-sustainability suggest. As with the business representation, one can see accounting and the accounting profession as successfully autopoietic.

Academic representation

As academics ourselves, perhaps the most bewildering exhibition of autopoiesis is that manifest by the academic system. That is, one might have *a priori*, expected that the academic community would be a very open system with a very assiduous attitude to perturbations that offered possibilities from which the system might learn. The core archetype would, we might anticipate, comprise such issues as freedom of expression, intellectual freedom, dedication to learning and rigour and so on. And, to a degree at least, one may find this with a burgeoning and often deeply analytical literature in and around sustainability. As Tanaka, Kendal and Laland (2009) observe, academic subsystems have the capacity to implement change as a role model and teacher for other social learners and systems. However, the story is rather more ambiguous when we look at the academic sub-systems of accounting and business management, (Gray and Laughlin, 2012; Gray, forthcoming).

Our contention would be that the academic system in accounting and business exhibits many of the same orientations and autopoietic symptoms as the accounting profession and business worlds as we conjectured above. That is, not whether (say) "weak" or "strong" sustainability is the more apposite intellectual position but rather that (i) claims to sustainability are employed with no demonstrable evidence of the link to the indicators of sustainability and (ii) the levels of engagement of the eco-efficiency orientated academics with the more radical conceptions is almost non-existent (as far as we can tell). Whether the manifestation of these observations is in textbooks, (see, for example, Dunphy et al, 2003), journal articles (see, for example, Thorpe and Prakash-Mani, 2003), assertions and assumptions about the compatibility of sustainability and the business case (see, for example, Obendorfer, 2004); or in teaching itself (see, for example, Stubbs and Cocklin, 2008) the same issues seem to apply. In some entirely bewildering fashion, the accounting and business system(s) exhibit the same potentially psychopathic autopoiesis as the arenas of practice and the profession, (Gray, forthcoming).

Conclusion to this section

The hope for sustainability accounting is that it might contribute to social change via the greater permeability of organizational and social boundaries that are recognizing perturbations from the external environment for change towards sustainability (Gray et al 1995). In this regard accounting – and the education which supports it – are ideally functioning as representations of what Robb (1991) sees as the substratum, the grounding work and the new language that needs to influence business and society systems through meaningful communication:- communication that should cause lasting change towards sustainability. However, as we have seen, the understanding of these perturbations relies upon the sub-system itself and here the news does not look good: business, accounting and education systems, whilst autopoietic, seem to be less open than a healthy system of autopoiesis might be and seem, therefore, to exhibit the behaviours of the potentially psychopathic.

6. Possibilities for the future

The prospects for societal engagement with sustainability are not promising. Depending how one considers these things the exigencies of sustainability have been in the public domain for over 40 years and yet the level of society learning

about sustainability remains woefully inadequate[14]. That change and learning *has* occurred is not in question – the more difficult and crucial question is whether the learning has been as deep as required and whether there has been sufficient consideration of the challenges that sustainability may well be making to the core archetype of human systems. We have contended that the business, accounting and educational systems have demonstrated an ill-developed sense of autopoiesis and have protected themselves, rejecting learning which challenges - but very appositely – areas of core archetype.

How might this matter be taken further? Autopoiesis stresses communication and learning and whilst it may still carry a burden of assumed rationality of response in the face of knowledge, there is clearly a desirability about social systems learning and responding sensibly. In this connection, four approaches to (what they call) "socio-cognitive engineering" are suggested by Cassapo and Scalabrin (2004) as a means to (in effect) stimulate and educate autopoietic systems into active learning. These approaches are: direct; allopoietic; autopoietic and mixed. Depending which subsystem we are trying to stimulate, each of these approaches has been employed fairly extensively by the social accounting community(ies).

The direct approach involves (principally) face to face communication in which "physical cognitive agents" engage within the subsystems as a means of enabling communication and encouraging learning. In the case of accounting and sustainability, such agents include social accounting academics acting through involvement with business systems, consultancies, professional accounting bodies, new initiatives (such as GRI and AccountAbility) and so on.

The allopoietic approach involves non-cognitive artifacts which are employed to mediate between the knowledge from the larger environment where the perturbations are occurring and the sub-system that needs to learn. Such `non-cognitive artifacts' comprise objects such as books, articles, journals and films which the sub-system recognizes, codes and seeks to learn from. In the area of sustainability, business and accounting there has been no shortage of these over the years written on a variety of topics to address a variety of audiences.

An autopoietic-artefact-mediated approach relies on (what Cassapo and Scalabrin call) artificial artefacts which "can plan, dialog, negotiate, coordinate and collaborate.

[14] See, for example, Bill McKibben (2012) " Global Warming's Terrifying New Math" *Rolling Stone Politics* July 19 http://www.rollingstone.com/politics/news/global-warmings-terrifying-new-math-20120719

The autopoietic artefact would have the essential elements of: a self-regulated autonomy, an emergent intentionality, and an emergent embodied identity. They can 'thoughtfully introduce themselves inside social networks and provide support to social processes such as communication and negotiation" (Cassapo and Scalabrin 2004, p8). Such artefacts would, in the fields of interest to us, most obviously comprise the innovative (but often artificial and parallel) accounting methods derived to help illustrate the information needs and the accountability potentials that arise from sustainability.

A mixed approach seeks to employ a rational combination of the other approaches depending on the environmental perturbations and the nature of the sub-system for which change is being sought.

Perhaps what is most remarkable about the foregoing is that all of the approaches have been tried extensively by individuals and groups through engagement, research, publications, presentations, and, most obviously through educational media. When one acknowledges this range of engagements and recognizes the very slow (if any) rate of change then the resistance of the autopoietic system is all the more apparent and all the more shocking. As Lee so persuasively noted we are dealing with systems which very successfully protect themselves whilst appearing to change. And the two things we know for certain are that the sustainability indicators continue to get significantly worse and more worrying and that business, accounting and educational systems largely continue with business-as-usual whilst offering superficial appearances of change.

It seems we inhabit a series of autopoietic systems but ones which can no longer learn and adapt. There is no good news in that.

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