Can Social Systems be Autopoietic? Bhaskar's and Giddens' Social Theories

JOHN MINGERS

INTRODUCTION

Maturana and Varela (Maturana, 1975; Maturana and Varela, 1980; Maturana and Varela, 1987; Mingers, 1995) developed the biological theory of *autopoietic systems*, that is systems that are self-producing or self-constructing, in order to explain the particular nature of *living* as opposed to non-living entities in the physical domain. However, as with many biological theories, later authors have tried to extend the domain of the theory to encompass social systems. In an earlier paper, Mingers (2002) considered the question of whether it was legitimate to characterise social systems as being autopoietic. In practice this means comparing autopoiesis not with social systems in themselves but with some theoretical conception of a social system. The evaluation was based on the social theory of Luhmann, a major sociologist who has adopted autopoiesis as a foundation. The result was equivocal—while Luhmann's work was seen as a consistent application of autopoiesis certain problems were identified in the resultant social theory.

The purpose of this paper is to assess autopoiesis against other theoretical perspectives, in particular those of Giddens (structuration) and Bhaskar (critical realism). Neither of these theorists adopt autopoiesis in as fundamental a way as Luhmann, but they both refer to the concept approvingly and their theories are based on the continual self-(re)production of society. In fact, it was initially intended to treat the two theories separately but as the work progressed it became harder to distinguish them at least insofar as the central core of self-producing systems was concerned. This has necessitated that the paper consider the debate between proponents of the two approaches. Initially, Bhaskar explicitly drew on structuration theory in developing his transformational model of social action (TMSA) but other sociologists, such as Archer and Layder, claimed that there was a substantive difference between the two in that structuration was overly subjectivist and did not give sufficient ontological status to social structure. In this paper I shall argue that, whilst there are differences, the criticisms of structuration theory are often misplaced.

The first section will consider the idea of social autopoiesis in general—the basic theory of autopoiesis; why this might be attractive for sociologists; and the

problems of applying a biologically-based theory to social systems. The second section will demonstrate how autopoietic notions can be seen in both structuration and critical realism. Section three will review the criticisms of structuration from a critical realist perspective and attempt to develop a synthesis of the two approaches against which autopoiesis can be evaluated. The final sections carry out the evaluation and draw conclusions.

SOCIAL AUTOPOIESIS

The central tenets of autopoiesis, the main attractions for sociologists, and the primary problems were described in Mingers (2002) and I will only summarise them briefly below.[1] In general, a *system* consists of components of different types, the relations and interactions between those components (the system's *structure*), and some form of boundary that demarcates it from its environment. Traditionally systems have been characterised as *open*, that is, maintaining a stable existence by taking in some inputs from the environment and producing some outputs.[2] Buckley (1967; 1968) tried to allow for change in social systems by viewing societies as complex adaptive systems which used internal feedback processes to change their structures to better survive in a turbulent and changing environment. As a paradigm example we could consider a firm transforming various physical and non-physical inputs into the goods and services it sells.

Autopoietic systems are quite different—they do not primarily transform inputs into outputs, instead they transform *themselves into themselves*. The components of an autopoietic system enter into processes of production or construction to produce more of the same as necessary for the continuation of the system. The output of the system, that which it produces, is its own internal components, and the inputs it uses are again its own components. It is thus in a continual dynamic state of *self-production*. The paradigm example is that of a single-celled organism such as amoeba.[3] Maturana distinguishes between the *organization*[4] and *structure* of systems. Actual examples of a system, e.g., a particular amoeba, have a structure that consists of components and their relations. Its identity, as an amoeba, is characterised in terms of its organization which is a subset of the relations of structure.[5] Thus all systems of a particular type have the same organization but can have different structures; and structure may change without changing the organization. So all living systems have the same autopoietic organization but this is realised in an infinity of different structures.

Autopoietic systems are *organizationally* closed—they are characterised by relations of self-production—but *structurally* (or interactively) open in that they do still have interactions with their environment. They are also *structure-determined*. This means that the changes they undergo in response to some external (or internal) perturbation are determined by the structure of the system at that time, not by the perturbing agent which can only trigger such changes. This is an aspect of

the autonomy of autopoietic systems.

Mingers (2002) identified the attractions of autopoiesis for sociologists as:

- The focus on self-production fits well with the ideas of Giddens and Bhaskar who both emphasise the way in which social structures are continually (re)produced[6] and transformed through the social activities that they govern.
- The distinction between organization and structure allows for radical change and development in a system's structure without loss of its identity as constituted through its organization. This occurs, for example, with companies, religions, and cultures.
- The organizational closure of the system means that we do not have to specify external inputs and outputs, nor do we have to see the system as functionally dependent on other systems. Its "purpose" is simply its own continual self-production.
- The idea of structural determinism places the origin of change and development firmly within the system rather than from the environment, whilst the concept of structural coupling shows how, nevertheless, systems and their environments can mutually shape each other.
- The theory also incorporates cognition, language and observation in a coherent manner. It is anti-Cartesian in not separating cognition and action but emphasising embodied cognition (Varela, 1991; Mingers, 2001). It is non-representationalist in its view of language. And it embraces self-reference and recursion in generating a biological theory of the observer and, indeed, itself.
- The acceptance of self-reference and the ideas concerning language and observation also fit in well with the linguistic and communicative turn (Habermas, 1979; Habermas, 1984; Habermas, 1987; Luhmann, 1989) in sociology and the greater recognition of the importance of the body (Turner, 1984; Featherstone, Turner et al., 1991; Shilling, 1993; Synnott, 1993; Grosz, 1994).
- It resonates well with social constructivist (Gergen, 1999) viewpoints—Maturana (1988) emphasises the extent to which we "bring forth" the world we experience through our own linguistic distinctions.
- Within legal theory autopoiesis has the potential to reconcile major problems. For instance, the split between the "pure theory" view of law as autonomous and the sociology of law view that it is societally dependent (Ewald, 1987); and the paradoxes generated by the fundamentally self-referential nature of law (Teubner, 1990)—"only laws make laws".

Autopoiesis represents a major advance over earlier open systems views in its sophistication and its potential for addressing many of the concerns of current social theory. However, there are major difficulties in simplistically applying the biological theory of autopoiesis to social systems (Mingers, 1992). If the idea of autopoiesis is just used metaphorically (Morgan, 1986) then the only question is

its fruitfulness, but if it is claimed that a society or organisation *is* autopoietic then significant ontological problems are raised (Brown, 1988; Stokes, 1990; Veld, Schaap et al., 1991; Meynen, 1992; Kickert, 1993). There are two definitive requirements for a system to be autopoietic:

1. Fundamentally, autopoiesis is concerned with processes of *production*—the production of those components which themselves constitute the system. Can we identify clearly what are the components of an autopoietic *social* system, and what are its processes of production of those components?
2. The autopoietic organization is constituted in terms of temporal and spatial relations, and the components involved must create a boundary defining the entity as a whole. In the case of social systems, is it possible to identify clear demarcations or boundaries that are constructed and maintained by the system?

Applying these notions strictly in the case of social systems clearly raises many problems that were highlighted in Mingers (2002) and will be explored in terms of Giddens' and Bhaskar's social theories below. If the standard model is found not to be applicable then might it be possible to employ a weaker version such as Varela's (1979) idea of *organizational closure* that does not specify processes of *production*? Or, could one use the idea of production to refer to non-physical entities such as concepts or ideas?

STRUCTURATION THEORY AND CRITICAL REALISM—THE RELATIONSHIP TO AUTOPOIESIS

Giddens' concept of structuration is one of the main developments in recent social theory and it does have definite resonances with autopoiesis:

• Giddens' concern with the continual, recursive, (re)production of social structure through time is clearly linked to the idea of self-producing systems (Mingers, 1996; Mendoza, 1997). In places, the idea of circular self-production is very clear[7]:

By its recursive nature I mean that the structured properties of social activity—via the duality of structure—are constantly recreated out of the very resources which constitute them (Giddens, 1984, p. xxiii)
    Human social activities, like some self-reproducing items in nature, are recursive. That is to say, . . . in and through their activities agents reproduce the conditions that make these activities possible. (Giddens, 1984, p. 2)
    all social life has a recursive quality to it, derived from the fact that actors reproduce the conditions of their social existence by means of the very activities that—in contexts of time-space—constitute that existence. (Giddens, 1987, p. 221)

• Both theories (autopoiesis and structuration) emphasis that explanations should be non-functionalist and non-teleological.

- Both distinguish between that which is observable, having space-time existence, and that which is not but is still implicated in the constitution of a system (*structure/organization* for Maturana, *system/structure* for Giddens).
- Both take an essentially relational view of social systems and identify the same three sets of relations: constitution/space, order/time and specification/paradigmatic.[8]

At the same time, a related conception of social systems (the transformational model of social activity—TMSA), developed from a philosophical position known as critical realism, is becoming influential. This was first articulated by Bhaskar (1979) as part of a comprehensive post-positivist, but realist, philosophy of natural and social science, and further developed in later works (Bhaskar, 1993; Bhaskar, 1994; Archer, Bhaskar et al., 1998; Harvey, 2002). At first sight this appears compatible with structuration theory with talk of the duality of structure, of the continual reproduction and transformation of society, and that social structure only exists in and through the activities it governs. However, there has been considerable debate about the degree of similarity as will be discussed below. Even more pertinent, however, is that Bhaskar specifically uses the term "autopoiesis" to describe fundamental aspects of the TMSA although nowhere does he actually reference Maturana and Varela's writing. To give some examples:

In discussing the nature of scientific knowledge, he says:

> These resources comprise the transitive objects of knowledge; their transformation is the transitive process of knowledge-production; and its product, knowledge (of an intransitive object or topic) in turn supplies resources for further rounds of enquiry. This imparts to the cognitive process a quasi-autopoietic character, with the production of knowledge accomplished by means of (anterior) knowledges. (Bhaskar, 1986, p. 54)
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> The quasi-autopoietic conception of scientific activity . . . implies that science is a continuous process of production, dependent on the imaginative and disciplined research (productive) and educational (reproductive) transformative activity of (wo)men. (Bhaskar, 1986, p. 83)

Here we can clearly see the primary concept of circular processes of self-production. Even more fundamentally, the basic mechanism of societal production is described as autopoietic:

> The activity-dependence of social structures entails its auto-poietic [sic] character, viz. that it is itself a social product, that is to say, that in our substantive motivated productions, we not only produce, but we also reproduce or transform the very conditions of our production. . . . Thus we can situate the *auto-poetic*, *conceptualised* and *geo-historically dependent* character of social structures alongside their *social relation dependence* as four ontological limits on naturalism. (Bhaskar, 1993, p. 156, original emphasis)

And finally he characterises emergence itself as being autopoietic:

> In emergence, generally, new beings (entities, structures, totalities, concepts) are generated out of pre-existing material from which they could have been neither induced nor deduced. . . . This is matter as creative, as autopoietic. (Bhaskar, 1993, p. 49)

Thus there is clear *prima facie* evidence that the theory of autopoiesis has been influential for both Giddens and Bhaskar.

In the next section I will first briefly cover the Giddens/Bhaskar debate and argue that the two are in fact potentially compatible, and then consider the extent to which autopoiesis may be involved in this conceptualisation. Before that it is necessary to mention a fundamental objection to the whole notion of social autopoiesis—that social systems or social structures do not exist in a causally efficacious sense at all.

The basic contours of this debate are as old as sociology itself. They used to be defined in terms of individualism versus collectivism and now tend to be discussed through the agency/structure distinction. Critical realism (strongly) and structuration (less strongly) maintain that social structure(s) exist, and have causal effects, over and above the actions of individual people. Upward conflationists, to use Archer's term (Archer, 1995) (downward reductionists as I would call them), deny causal reality to social structure, which they see as simply an effect or epiphenomenon of individual social interaction. This case has been argued strongly in terms of the primacy of hermeneutics by King (1999; 1999; 2000) against both Giddens and Bhaskar, and has been rebutted by Archer (2000). There has been a related debate couched in terms of whether or not social structure can be causally efficacious between Varela and Harré (Varela and Harre, 1996; Varela, 1999; Varela, 2002) and Lewis (2000) and Bhaskar (2002).

I do not wish to enter this debate directly for that would subvert the main purpose of the paper but it is clear that any attribution of autopoiesis to the social world must presume the existence and efficacy of social structure. To accept the opposite would immediately foreclose the possibility of social autopoiesis. So, for the purposes of this paper I will simply take as given that the social world is not exhausted by the individual's meanings and actions whilst recognising that this is actually an ongoing debate.[9]

GIDDENS AND BHASKAR: A DISTINCTION WITHOUT A DIFFERENCE?

Bhaskar's Transformational Model (TMSA) and Giddens' Theory of Structuration

It is inevitable within social science that particular authors will use certain basic terms such as "society", "social structure", or "social system" in different ways. There is then much debate about these terminological differences that may obscure the similarities of the underlying conception or model. Certainly there are differences of substance and emphasis between Bhaskar and Giddens, not least because they approach their common object from different directions—philosophy and sociology respectively, but within the wide realm of social theory as a whole they seem to me to occupy essentially the same niche.[10]

Bhaskar's central realist proposition is that, in both the natural and social worlds, there exist structures or mechanisms with particular powers or tendencies (the domain of the *real*). These interact in such a way that actual events occur (or do not occur) (the domain of the *actual*) and some of these are observed or experienced by people (the *empirical*) as part of the process of developing knowledge. These mechanisms (or perhaps systems) do not have to be physical, or even observable—the criterion for existence is the non-empiricist one of causal efficacy. This means that concepts, ideas, rules and practices, for instance, are no less real for being unobservable (Bhaskar, 1997). For Bhaskar, society exists as an object in its own right, emergent from but separate to people and their activities, and with its own properties.[11] Society always pre-exists individuals who do not therefore create it but only transform or (re)produce it. Nevertheless, society is *necessary* for social activity and it only *exists* in virtue of that activity. Society therefore conditions social activity and is either maintained or changed as an outcome of that activity (*the duality of structure*). Equally, human action (praxis) is both a conscious production, i.e., intentional bringing about of purposes, and an unconscious (*re*)production of society (*the duality of praxis*).

> At the heart of this idea is the conception of human agency or *praxis* as transformative negation of the given . . . ; and at the same time as both enabled and constrained by and reproductive or transformative of the very conditions of this praxis, so that these conditions are *activity-dependent* or auto-poietic . . . (Bhaskar, 1994: 93, original emphasis)

Society is said to be an "ensemble" of structures, practices and conventions, where structures are relatively enduring generative mechanisms that govern social activities. Being more specific, Bhaskar suggests that there must be a linking mechanism between human action and social structure and that this mediating system consists of *position-practices*, that is combinations of roles that can be filled and practices that are then engaged in. It is important to note that position-practices are relational—they develop to form a system in relation to each other and this is separate from any network of relations between those who happen to occupy them. Whilst emphasising the ontological reality of social structures, Bhaskar recognises that they have significantly different properties from physical objects. In particular:

- Social structures do not *exist* independently of the activities they govern;
- Social structures cannot be *empirically identified* except through activities;
- Social structure is not independent of actors' *conceptions* of their activity;
- Social structures are *relative* to particular times and cultures.

Despite these differences they are still suitable subjects for scientific theorising even if they lead to particular epistemological difficulties (Bhaskar, 1979).

Structuration theory also has a core distinction at its heart—that between social *structure* and social *system*. Taking first social structure, this does not describe

empirically observable patterns or regularities as in functionalism but underlying sets of rules that generate the observed regularities more akin to structuralism.

> Structure, as recursively organised sets of rules and resources, is out of time and space save in its instantiations and co-ordination as memory traces, and is marked by an 'absence of the subject'. The social systems in which structure is recursively implicated, on the contrary, comprise the situated activities of human agents, reproduced across time and space. (Giddens, 1984, p. 25)

Structure is thus seen as similar to a code or set of rules that governs possible selections of social action. It is constituted as an "absent set of differences" that is not empirically observable as such, but is only exhibited in particular social inter-actions. Its existence is said to be "virtual". In fact, structure should really be seen as the structuring properties of social systems and these properties can be under-stood as rules and resources, recursively implicated in the reproduction of social systems. Social systems, by contrast to structure, do exist in time-space, and con-sist of observable activities and practices. The regularities that we can observe in social systems occur both spatially and over time and this observable patterning and inter-dependence is brought about and sustained through the virtual (unob-servable) structure governing their activity.

The relationship between system and structure is provided by the concept of *structuration*, a two-fold process which Giddens sometimes refers to as the duality of structure. First, structure organizes the practices that constitute a social system—actors draw on the structural rules and resources in the production of interac-tion. But, secondly, it is precisely and only these interactions that reconstitute (and possibly transform) the structure. "The structural properties of social systems are both the medium and the outcome of the practices that constitute those systems" (Giddens, 1979, p. 69). This is the central kernel where both the TMSA and structuration appear to be an embodiment of autopoiesis.

TMSA versus Structuration

In the beginning there appeared to be clear resonances between structuration theory and Bhaskar's early social theory as even Archer (1995, p. 147) accepts.[12] The following could easily be describing structuration theory:

> On this model, unintended consequences and unacknowledged conditions may limit the actors understanding of their social world, while unacknowledged (unconscious) motivation and tacit skills may limit his or her understanding of himself or herself (Bhaskar, 1986: 125)[13]

However, on deeper inspection it became clear that there were in fact substantive differences. Bhaskar wrote:

> This {analytically discrete moments of social interaction} is a feature which, as Margaret Archer has convincingly demonstrated, distinguishes it {TMSA} from structuration, or more generally any 'central conflation' theory (Bhaskar, 1993, p. 160, my insertions).

These differences revolve around the ontological status of social structure in the two theories. For Bhaskar, there is a *dualism* of two distinct entities—people and their social activity on the one hand, and the social structure(s) that emerge from and also enable and constrain such activity on the other. Both are equally real. For Giddens, there is a *duality* between observable social systems and their unobservable, virtual structural properties.

Several writers from the critical realist camp have been deeply critical of structuration theory, for instance, Archer (1990; 1995), Layder (1985; 1987; 1989), Craib (1992), (Thompson, 1989) and Porpora (1989). The fundamental claim, made by each author in different ways, is that Giddens does not give sufficient ontological independence to social *structure* (or system). That he essentially treats agency and structure as though they are inseparable, two sides of the same coin, with centrality being afforded to the encompassing notion of social practices. This means that Giddens remains too much on the subjectivist side of the fence, refusing to accept the leap into an objective, constraining social structure. I accept that there is force to this argument. Giddens adopts a perspective that puts much greater emphasis on the knowledgeable activities of agents and does not recognise a separately existing social structure in the way that Bhaskar does. However, I will argue that the anti-Giddens camp go too far and erect something of a straw man in their characterisation of Giddens who would not hold some of the extreme positions that they impose on him. This then allows us to consider a possible synthesis of the two models.

To begin with Archer (1995) whose position can be summarised as follows:

> A realist ontology which regards structural and cultural systems as emergent entities is at variance with the Elisionists' {Giddens et al.} view which holds, (a) that such properties possess a 'virtual existence' only until, (b) they are 'instantiated' by actors, which (c) means these properties are neither fully real nor examinable except in conjunction with the agents who instantiate them (Archer, 1996: 692, my insertion).

This, according to Archer, has several consequences:

- Both elements, agency and structure, are denied autonomy and their own separate properties since both are subsumed under social practices. This has the effect of flattening ontological strata losing both that of social system and that of psychological individual.
- This means that we cannot investigate each as a separate entity, except in the limited sense given by Giddens' methodological bracketing; nor can we consider the ways in which agency and structure, as independent entities, might causally interact with each other.

- The time dimension is lost. Since structure and agency are simply different reflections of the *same process*, they must be simultaneous. We cannot conceptualise how structure at time t conditions activity at t+1 which then transforms or reproduces structure at t+2. Archer suggests that Giddens moves from the obvious "no people: no society" to the questionable "this society; because of these people here present" (Archer, 1995, p. 141).
- This also makes it difficult to understand under what conditions social activity will change rather than simply reproduce the pre-existing conditions. This can be put another way in terms of the difference between *social* and *system* integration. For Giddens the distinction is primarily one of scale—face-to-face relations as opposed to relations between collectivities at a distance. Archer argues that there cannot therefore be a disjunction between the two. Whereas a separation of the two would allow different degrees of integration/ conflict in the two domains so that, for example, social conflict may or may not result in systems change.

Porpora (1998) examines four different concepts of social structure—stable patterns of aggregate behaviour (e.g., Homans or Collins); lawlike regularities among social facts (e.g., Durkheim or Blau); systems of relations among social positions (Bhaskar); and virtual rules and resources (Giddens). He argues that Giddens is a realist in accepting that structural rules and resources do causally affect social activity, but is not sufficient of a realist to also grant causal efficacy to the "objective" social relations to be found in Giddens' social system. Rules and resources are important, but are ultimately subjective (or intersubjective) in necessitating some degree of at least tacit understanding and knowledge on behalf of actors. In contrast, Porpora suggests that of more fundamental importance are the material, objective social relationships such as the distribution of income, the division of labour, and job opportunities that act as external constraints on individuals. The heart of the disagreement is that "Giddens gives analytical priority to rules and in fact denies that the relationships of a social system have any causal properties independent of the rule-following activities of human actors" (Porpora, 1998, 350, my emphasis). Whereas Porpora maintains that social relations do constrain in a way that is independent of the actor's knowledge of them.

Layder's (1985; 1987; 1989) critique seems to rest on a rather partial reading of Giddens' work. For instance, one of his main arguments is that the idea that social system and social structure must always be instantiated through social activity loses an essential distinction between such activity and pre- and post-existing system/structure. He quotes (Layder, 1987, p. 34) Giddens' "social systems only exist in so far as they are continually created and recreated in every encounter as the active accomplishment of subjects" in support of his view. But Giddens is saying something rather different: not that social systems only exist at all in the moments of their instantiation but that they will no longer exist if they are not continually re-enacted. He is simply making the point that particular practices

will only remain in existence if they are, in fact, practiced. Indeed, the use of the term "recreated" in the quote clearly acknowledges the fact that there is something already existing, which is recreated or reconstructed through social activity.

A similar misinterpretation occurs in Layder's discussion of the extent to which social structure can constrain action. He construes Giddens as saying that constraints can only be identified with that which is internal to a particular episode of social interaction and indeed ultimately with the psychological motivations of the actors involved. What Giddens actually says, as quoted by Layder (1987, p. 39), is "Structural constraints do not operate independently of the motives and reasons that agents have for what they do. . . . The only moving objects in human social relations are individual agents who employ resources to make things happen, intentionally or otherwise." Layder then makes the illicit equivalence that "The word 'operate' doubles for the word 'exist' " (Layder, 1987, p. 40).

Again, I would argue that Giddens is saying something significantly different and that *operate* does not in fact equal *exist*. Giddens' point, and it is a very fundamental one that I believe is accepted by Bhaskar and Archer, is that only people can actually undertake social activities. Systems, structures, practices or whatever do not, of themselves, act—only people can do that. So structural constraints can only have effects (operate) by affecting people, and in particular by shaping their motives and reasons for action. This does not mean that such constraints do not *exist* independently of and prior to the activities of particular individuals. It simply means that the powers of the constraint are not actualised (to use a Bhaskarian term) except through people. Nor does it mean that the actors involved have full transparency over the process. Giddens' accepts that there are both unacknowledged conditions of action and unknown consequences of action. So it is quite possible for constraints to determine aspects of the contexts within which people find themselves and thereby shape the choices made without those involved being fully aware of it.

With regard to the fundamental question of ontology, it seems to me that there is a substantive difference between Bhaskar and Archer's dualist model and Giddens' dualism at least in so far as social *structure* is conceptualised, although both see social structure as only *existing* and *observable* through social activity, and inevitably dependent (to some extent) on actors' knowledge of what they are doing. But I do not accept Archer's (and Bryant's (1995, p. 97)) view that Giddens cannot therefore be seen as a realist because of the *virtual* nature of his concept of structure. I would argue that this is a mistaken interpretation of the term "virtual". Giddens uses this in contrast to those things that have space-time presence—that is that happen at particular times and places. Virtual rules and resources do exist; they are *real*; they are as Giddens says "generative"—they do have causal effects; but they endure and underlie the events that they enable. Indeed, the distinction is very close to that which Bhaskar makes between the domain of the *real* (enduring mechanisms) and the domain of the *actual* (particular events). Thus it is not virtual as opposed to real, but virtual as opposed to actual.

I do, however, think there is a substantive difference in the way Giddens and Bhaskar conceptualise the term "structure" and this is the basis of much of the problem. Bhaskar takes a traditional view that out of the social activities of people a new entity emerges—*society*. This is said to consist of various *structures*—that is relational systems of position-practices that govern, and are reproduced/transformed by, social activity. This is essentially the same as Giddens' social system,[14] consisting of practices which, when long-standing and widely spread, are termed institutions, a term also used by Bhaskar. What Giddens then does is to highlight a particular aspect of the mechanism whereby social systems govern activity and the activity reproduces the system—that is rules and resources. Practices and institutions, which can be observed, must have rules[15] underlying them for the activities to occur although these will not be observable save through the activities. In calling these rules and resources "structure" Giddens recognised that he was moving away from the common usage of the term although he was not uncomfortable with its continued traditional use as in "class structure" (Giddens, 1984: 19). It could be said that Bhaskar's usage of structures as "generating mechanisms" is itself a new development.

I would suggest that the two views can be reconciled by using "structure" in Bhaskar's sense and saying it consists of positions, practices, and the rules and resources that underlie them[16] but then using much of Giddens' substantive theorising about how such a complex and stratified structure interacts with praxis.[17] Although it might be objected that this would return from duality to a dualism, there are elements of structuration theory that seem to fit and to answer some of the more detailed points raised by Archer above.

First, Giddens recognises that structures may be transformed, not simply reproduced. In fact he identifies four different mechanisms of social change (Giddens, 1990): *system reproduction*—the gradual and unintended drift of social practices; *system contradiction*—conflicts of interest within and between social systems; *reflexive appropriation*—conscious shaping of social systems, especially organisations; and *resource access*—changes generated by changing availabilities of resources. This implies that there is a degree of distanciation between structure and system—rules are not causally determinative but may be enacted in different ways, and the consequences of action, intended or not, may bring about structural change rather than reinforcement.[18]

Second, Giddens does recognise the temporal element in the structure/action relation, the idea that actors do not create *de novo* but always transform or reproduce something that pre-exists them.

> Human societies, or social systems, would plainly not exist without human agency. But it is not the case that actors create social systems: they reproduce or transform them, remaking what is already made in the continuity of praxis (Giddens, 1984: 171).[19]

Further, in discussing the structuring of institutions he says that this "raise{s} once more the problem of history, since the absent others include past generations

whose time may be very different from that of those who are in some way influenced by residues of their activities" (Giddens, 1984, p. 37). He even accepts that all social life, from the micro to the macro, is inevitable "episodic" (Giddens, 1984, p. 244), that is it can be regarded in terms of sets of events having specifiable beginnings and ends during which significant changes to the social structure may occur. This all goes against Archer's assertion that structuration theory limits itself to the activities of presently existing people and is unable to recognise the effects of an already existing structure.

Third, when considering specific mechanisms by which social institutions are reproduced, we can see causal relations between system and structure. The concept of structure itself is stratified into different levels of abstraction (Giddens, 1984: 185). The most abstract and enduring are "structural principles" which underlie the organisation of whole types of society—e.g., capitalist. At the next level are "structures" which are particular sets of transformation relationships between elements within a society, e.g., the relations between commodities, money and capital.[20] Finally, there are "structural properties" or "elements of structuration" which are the most concrete, linking specific systemic occurrences with wider societal institutions. An example is the division of labour—a general structural property that is enacted within particular organisations. These are linked to dynamic processes of reproduction or change—what Giddens calls homeostasis and reflexive regulation[21] or circuits of reproduction (Giddens, 1984: 190). An example is the poverty cycle of deprivation—poor schooling—poor jobs—deprivation—poor schooling. Clearly such causal loops can be seen as structural generating mechanisms the exercise of which results in particular, observable phenomena.

With regard to Porpora's criticism, I suggest that he is imposing a rather crude dichotomy onto what is actually a complex mix of known and unknown conditions of action. Giddens (1989) himself speaks of three ways in which action may be constrained—first, the material constraints of the body and the physical world (which can of course be changed through technology); second, constraints stemming from the direct application of some form of power or sanction (which can vary in intensity); and, third *structural* constraints imposed by the context of action of an individual.

In this latter case, Giddens recognises constraints deriving from the pre-existing social situation and from the social relations in which actors find themselves:

> All structural properties of social systems have a similar 'objectivity' *vis-à-vis* the individual agent. How far these are constraining qualities varies according to the context and nature of any given sequence of action (Giddens, 1984: 177).

He goes on to accept the legitimacy of a sociological explanation in terms of social forces (such as technology) "without reference to agents' reasons or intentions". However, structural constraints are not causally determinative in the way that physical forces sometimes are, and they also differ in always being enabling

of action as well as constraining it. He insists that ultimately all such constraints must work through individual (or groups of) actors by restricting the range of choices available in particular situations—the greater the degree of constraint, the less options available. Thus, there is in principle always some degree of choice even when actors feel they have but one course of action. This does not imply that actors are always (or ever) fully aware of many of the conditions or consequences of their activity. There are limits here in terms of both unconscious motivations and unknown conditions of action.

> It is equally important to avoid tumbling into the opposing error of hermeneutic approaches and of various versions of phenomenology which tend to regard society as the plastic creation of human subjects (Giddens, 1984, p. 26)

To summarise this section, I have tried to show that Giddens' and Bhaskar's conceptions of society and social structure, while different, can usefully be synthesised. Social structures, consisting of position-practices, rules, and resources, are generating mechanisms that, through their complex interactions, enable and constrain observable social activity which in turn reproduces and transforms these structures. Society is then a particular combination of both praxis and structure that is historically and temporally located.

AUTOPOIESIS AND SOCIAL STRUCTURE

There are two questions to be answered in this section—whether it is possible to apply autopoiesis to the social theory outlined above? And, if it is, what benefits this would bring?

We can see elements of circularity, self-reference, and production in the above description. First and foremost, as illustrated by the quotations at the beginning of this section, is the mutual dependence of praxis and structure. Social activity could not occur without a pre-existing structure, but the structure itself is only produced and reproduced through the activity. In a very general sense this must be seen as self-production—to take Bhaskar's two dualities, structure continually produces itself through its enactment in praxis, while praxis continually produces its own pre-conditions through its crystallisation in structure. Going below this generality, we can see that Giddens especially has identified many specific causal loops or circuits of reproduction that can be seen as akin to the sorts of chains of chemical reactions which occur within cells. However, is this enough to accept social autopoiesis? The conditions to be met were articulated above—what are the components and what are the processes of production of those components? And can we identify a clearly demarcated boundary so that the system can be said to act as an organizationally closed unity and to produce itself as a whole?

With regard to the components it seems clear that they cannot be the actors themselves for they are the result of systems of biological production. I also do not think that it could be their actions or activities as such, for whilst these may be conditioned by social structure they are surely not, in general, produced by it, in the same way that the structure of language enables and constrains what *can* be said, but not what *is* said. Peoples' actual actions surely result from their own stratified and historically situated self, albeit reacting to a particular social context or situation, and expressing itself through legitimised forms of behaviour. This only leaves the elements of social structure—rules, positions, practices etc.—as potential components for social autopoiesis, but this fits in quite well with the paradigmatic example of non-physical autopoiesis, *Nomic*,[22] discussed in Mingers (2002). Here, it was specifically the rules of the game that were the self-producing system rather than the players or their actual moves.

If these are the components, what then are the processes of production that generate them? First, we need to consider what sense can be given to the term "produce" here as this is one of the problems Varela himself highlights—instantiating the concept of production within the realm of social systems.

> In order to say that a system is autopoietic, the production of components in some space has to be exhibited; further, the term production has to make sense in some domain of discourse. Frankly, I do not see how the definition of autopoiesis can be *directly* transposed to a variety of other situations, social systems for example. (Varela, 1981: 38)

When applied to biological systems it refers to processes of molecular interaction that generate new molecules which then participate in further interactions. It is clear from the discussion of structuration that actors do not produce structure anew but rather reproduce or transform that which already exists. However I do not see that this is incompatible with a notion of production since one could say that molecular production does not create something from nothing, but simply reorganises or recombines components (atoms and molecules) that already exist. One significant difference from the Nomic example is that in the game the moves are intended to change the rules—that is their primary purpose—and the players will be conscious of this, whereas most if not all social activity is *not* intended to reproduce structure, this is merely an unintended and probably unrecognised consequence. Again, I do not see that this invalidates the notion of production— all that is necessary, and indeed both Giddens and Maturana stress this non-functionalist view—is that (re)production of structure actually occurs. If it does, whether intended or not, autopoiesis continues; if it doesn't, the particular social practices will die out.[23] A tentative conclusion thus far is that we can, contra Varela, identify components and processes of production.

The second major requirement of autopoiesis is that the system is organization-ally closed and generates its own boundary.[24] This means that the network of processes involved must feed back upon themselves to form a circular concatena-tion and thereby implicitly demarcate itself from its surroundings. In the case of

physical autopoiesis the boundary would be spatial and would involve specific components (e.g., the cell wall) but as Varela points out this is not necessary in the more general case of organizational closure where the nature of the boundary will depend on the type of components involved.

Whether this condition is satisfied is harder to answer in the case of social systems. Taking firstly the question of closure under some type of circular relationship, there is clearly a form of closure between the social structure in general and the social activity through which it is (re)produced. However this is rather different to the circularity of physical autopoiesis where molecules interact with other molecules to produce yet more molecules. In the social case the relation is between two different strata—social structure and social action rather than within the one strata.[25] To be strictly analogous to the physical example we would have to look for circularity among the elements of structure—position-practices and rules producing more of the same. There no doubt there are many relationships between these components, indeed Bhaskar (1979: 41) defines them relationally, but since social structure only exists through social activity, positions and rules cannot simply produce themselves. This situation is clear in Nomic— the rules are only transformed through the activities of the players. This of itself does not preclude organizational closure, but we would have to accept that social systems are different from material systems in the ways Bhaskar suggested above.

Apart from the general notion that action (re)produces structure, we can also see many specific circular feedback loops involved in this process. Giddens distinguished three different types—homeostatic loops via unintended consequences of action, self-regulation through information filtering, and reflexive self-regulation involving conscious manipulation of social institutions, and uses the poverty cycle as an illustration of all three. We could obviously look empirically at any part of society and discover an enormously complex inter-meshing of causal loops involving both observable activity and events stretching over time and space and the underlying structure of positions and rules. The difficult question, though, is to what extent such circuits can be said to form a boundary, or at least demarcate themselves from the background. This is a strong but necessary feature of organizational closure as defined since it is what accounts for the systems' identity and its domain of possible interactions as a whole.

> Thus a unity's boundaries, in whichever space the processes exist, is indissolubly linked to the operation of the system. If the organizational closure is disrupted, the unity disappears. This is characteristic of autonomous systems. . . . It is also apparent that once a unity is established through closure it will specify a domain with which it can interact without loss of identity. (Varela, 1981: 15)

We can see how this applies to physical systems such as the nervous system or the immune system (Varela, Coutinho et al., 1988). In the case of non-physical system if it is well defined such as Nomic we can say that at any point the system is able to distinguish inside from outside—valid rules from invalid ones. But it is

not obvious that we can actually identify such clear-cut examples as Nomic within the mêlée of society as a whole. There are many different possibilities (Giddens, 1990, p. 303)—nations, states, or perhaps societies as such; Western capitalism as a whole; enduring institutions such as religions or political parties; particular collectivities such as firms, clubs or social movements; small-scale groupings such as a family or a sports team; or, following Luhmann, functional subsystems such as the economy, law, and politics. Considering what might be the boundaries of a society and what could be its domain of actions as a unity can indicate the difficulties.

Giddens (1981: 45) has suggested three criteria for a social system to be considered a society: i) an association with a particular time-space location with a legitimate claim to make use of it; ii) a shared set of practices involving both system and structure; and iii) an awareness of a shared identity. In terms of time and space, societies will be localised to some extent and, especially in historical times, there may well have been particular examples such as nomadic peoples or forest tribes who were genuinely self-contained. We can look back and see different societies clashing with each other as in periods of colonisation. But in the modern world, with its tremendous global interpenetration through communications and transport, is it possible to draw any such lines any more? Societies certainly don't coincide with nation states being both wider, e.g., European society, and narrower, e.g., Scottish and English. Indeed it can be argued (Angel, 1997) that nation states themselves will become of lesser importance than global companies. Luhmann (1982) concluded that one had to go up to the level of the world society as a whole.

We can also to some extent pick out enduring social practices but at which ever level we look these are many and diverse. There may be greater differences within a notional society than between that society and another, especially with the tremendous intermixing of ethnic and cultural groups within modern societies. A sense of identity may be equally polysemous—one could feel Mancunian, English, British, European, or Western depending on who one was interacting with. As Giddens concludes,

> It is important to re-emphasise that the term 'social system' should not be understood to designate only clusters of social relations whose boundaries are clearly set off from others. . . . I take it to be one of the main features of structuration theory that the extension and 'closure' of societies across space and time is regarded as problematic. (Giddens, 1984: 165)

Summary

This section has developed the following conclusions concerning the application of autopoiesis to social systems as seen from a broadly structurationist perspective.

In terms of components and processes of production,

- we can take the components of such a system to be those of social structure developed above—rules, resources, positions and practices;
- we can identify processes of production (in terms of reproduction and transformation) of these components provided we accept that with social systems production involves the transformation of an existing structure, and a duality between social structure and human activity.

In terms of organizational closure,

- We can identify a circularity of relations both in the generic (re)production of structure and in specific causal chains;
- But, it is difficult in general to identify specific social systems that are clearly bounded and have identity. This may be possible in specific, well-defined instances (for example, Nomic) but this would require empirical verification.

Thus we cannot conclude in general that social systems, conceptualised as a synthesis of structuration and critical realism, *are* autopoietic. Nor can we follow Varela and say they are not autopoietic but organizationally closed. However, most of the key elements of self-producing systems can be seen in social systems, and it may be that particular examples could embody them all.

CONCLUSIONS

The purpose of this paper and the previous one was to evaluate in detail the extent to which social systems could be conceptualised as self-producing, autopoietic, in an ontological rather than simply metaphorical sense. The first step was to specify clearly what we took to be the essential core of the theory of autopoiesis— a specification of particular components that participate in processes of production of similar components within a well-bounded whole. The next step was to consider the extent to which autopoiesis was compatible with, or contributed to, existing social theories. For this purpose Luhmann's communication theory, Giddens' structuration theory, and Bhaskar's transformational model of social activity have been examined.

In the case of Luhmann (Mingers, 2002), the conclusions were that his social theory did consistently embody a version of autopoiesis although not being wholly compatible with Maturana's original formulation. The components were clear (communications) and a mechanism was specified for generating closure, but the production processes and the supposed isolation of various systems was considered problematic. However, this theoretical purity was only obtained at the expense of a very abstract and impoverished view of social processes and interactions.

In the case of structuration theory, we had first to construct a synthesis from two different versions developed by Giddens and Bhaskar respectively. The conclusion then was that components and processes of production could be identified (rules,

resources, positions and practices), but that it was extremely difficult to identify empirically the bounded closure of a particular social system.

Thus, the overall conclusion is one of agnosticism. Autopoiesis as a social theory has many attractions, and there may be very specific social situations, exemplified by Nomic, where it could be identified. But, in general, I do not believe that social autopoiesis has yet been demonstrated. Nevertheless, further research in this area is certainly to be encouraged:

- Attempting to demonstrate empirically a self-constructing social system along the lines described in the paper.
- Developing further Maturana's other theoretical ideas concerning the biological basis of observation, languaging, and embodied cognition. This leads to a particular view of interacting human agents at the individual level which could possibly be combined with modern complexity theory (Byrne, 1998) at the system level to produce an interesting new synthesis.
- Synthesising Giddens' and Luhmann's theoretical systems which seem to me to be potentially complementary. They could be developed as an orthogonal pair of distinctions—that between observable system and underlying structure on the one-hand (Giddens), and, within the system, that between individual interaction and societal communication (Luhmann).

John Mingers
Kent Business School
University of Kent
Canterbury, Kent CT2 7PE, U.K.
j mingers@kent.ac.uk

GLOSSARY OF AUTOPOIETIC CONCEPTS

Note that Maturana (1987) contains a comprehensive description of the main concepts.

An observer is a (human) being capable of making distinctions and descriptions through language and whose lived experience is always within language.

A unity is an entity or whole that is distinguished by an observer in relation to a background or medium. A unity may be simple (unanalysed) or composite (analysed into components by further distinctions). The type or identity of a simple unity is characterised in terms of properties of the whole in a metadomain to its components. A composite unity is distinguished in terms of components and their relations which taken together generate the simple unity.

Organisation and structure: composite unities have both an organisation and a structure. The organisation is a particular subset of the relations between components that determine the properties of the unity as a whole and thereby its

identity, type or class. All unities of a particular type have the same organisation. A change of organisation implies a change of identity and *vice versa*. The structure of a composite unity is the total set of actual components and relations belonging to a particular example or instance. Unities with the same organisation may have different structures, and the structure of a particular entity may change without its organisation changing. Organisation is abstract, structure is concrete.

Structure-determined systems: all composite unities consist of components and relations (structure), and so any change in the unity must be a change in its structure. Such a change will be determined by the properties of the components and their relations at that particular point in time, that is, it will be structurally determined. Outside agents can only trigger changes, they cannot determine the nature of the change.

Structural coupling is a mutual relationship or correspondence between the structure of a unity and the structure of its environment (including other unities within the environment). This occurs when a unity undergoes recurrent interactions within its environment whilst maintaining its identity and therefore its organisation. The changes in structure that occur must be such as to allow the maintenance of the organisation within that particular environment.

Autopoiesis describes a particular type of organisation. Autopoietic systems are organised in such a way that they produce their own components—they are self-producing systems. Formally, "*a composite unity whose organisation can be described as a closed network of productions of components that through their interactions constitute the network of productions that produce them, and specify its extension by constituting it boundaries in their domain of existence is an autopoietic system*" (Maturana, 1987: 349). A living system is a special case of an autopoietic system—one whose components are molecules.

The autopoietic organisation can be characterised in terms of three types of relations between components and production processes: *specificity* (what), *constitution* (where), and *order* (when).

Autopoietic systems are characterised by *autonomy* since they are not dependent on external production processes, and *self-reference* since their organisation closes in on itself and their structure is self-defined—it can be any so long as its supports autopoiesis.

Allopoiesis describes all types of organisation that produce something other than themselves.

Cognitive domain of interactions: the set of possible interactions that an autopoietic system may have in a particular environment that are *effective*, that is, that preserve autopoiesis. For Maturana, effective action *is* knowledge: "*living systems are cognitive systems, and to live is to know.*" (Maturana, 1987: 357).

Consensual domain of interactions: when two or more autopoietic systems interact recurrently with each other, structural coupling may lead to interlinked sets of interactions between them which may appear to an observer to be co-ordinated. Such an ontogenetically established domain of *co-ordinations of actions* is

a consensual domain. To the extent that such co-ordinations of action have particular effects or meaning within the interaction they may be described as *linguistic*.

Language: within a consensual domain, the co-ordinations of action may become recursive—that is, particular co-ordinations of action may become tokens or symbols for others. This gives rise to language—a domain of consensual co-ordinations of consensual co-ordinations of action.

NOTES

[1] I include here a Glossary of the main concepts of autopoiesis taken from the earlier paper.

[2] Bhaskar uses the term "open" in a more general sense to show that social systems cannot be controlled or closed in the way that a physical system is controlled in an experiment.

[3] See the Glossary for a definition of an autopoietic system.

[4] I shall generally use "organization" to mean specifically Maturana's concept and "organisation" more generally.

[5] The autopoietic organization can be characterised in terms of three types of relations between components and production processes: *specificity* (what), *constitution* (where), and *order* (when). Autopoietic systems are characterised by *autonomy* since they are not dependent on external production processes, and *self-reference* since their organization closes in on itself and their structure is self-defined—it can be any so long as its supports autopoiesis.

[6] Autopoietic theory uses the term "production" to emphasise that it does not mean "reproduction" in the sense of creating another, as in a baby. Indeed Maturana says that reproduction is *not* a defining feature of living systems. Sociologists tend to use "reproduction" to emphasise that it is an already existing society that is continually being maintained or transformed. I take the two to be broadly compatible.

[7] Giddens himself mentions autopoiesis: "The most relevant sources of connection between biological and social theory . . . concern recursive or self-reproducing systems. There are two related types of theory involved here . . . {the theory of automata} . . . is not of as much interest to the conceptualisation of social reproduction as recent conceptions of cellular self-reproduction (autopoiesis)" . . . (Giddens, 1979: 75).

[8] Giddens (1981: 30). To unpack this slightly, these three relations/differences are the *where*, the *when*, and the *what*. Space and time are straightforward and can be seen as syntagmatic dimensions. The third dimension of difference is paradigmatic—that is a specification or selection from a domain of differences. For Giddens, the first two relate to system and the third to structure.

[9] Very briefly, my argument against the hermeneutic critique is the obvious one that understanding is never transparent to itself either in terms of its grounds or its consequences. With regard to causality, we can accept that people are the only source of intentional, efficient causation but, as with any system (including physical ones such as amoeba) the parts act in a way that generate the emergent properties of the whole but, at the same time, the configuration of the whole shapes the behaviour of the parts. With a more Aristotelian view of causation we can accept that only people act (efficient cause), but that society shapes that action (material and formal cause).

[10] In this, I largely agree with New (1994) but disagree with Wright (1999) who takes criticisms of Giddens largely on trust.

[11] Bhaskar contrasts this with a "dialectical" view of the relationship (as advocated by Berger and Luckmann (1967)) which, he claims, sees people and society as two moments or sides of the same process, rather than as two distinct, but interacting, objects. This is a criticism that has been applied to structuration theory (Archer, 1996).

[12] Bhaskar relates his work to Giddens (Bhaskar, 1979, p. 35), and Giddens also uses Bhaskar's arguments (Giddens, 1984, p. 340).

[13] This is repeated in one of Bhaskar's later discussions of the social (Bhaskar, 1994, p. 95).

[14] Although Giddens might disagree on the extent to which "society" can be clearly identified—see later.

[15] Interpreted in Giddens' general sense of procedures for enacting practices (Giddens, 1984: 21).

[16] Cohen (1989: 209), one of the main interpreters of Giddens' work, also suggests that Bhaskar's notion of position-practices could usefully be incorporated in Giddens' structure.

[17] An interesting anomaly in Giddens' concept of structure has been pointed out by Sewell (1992). It is said to consist of rules and resources, and resources can be authoritative (power over people) or allocative (power over objects). Allocative resources are themselves material, e.g., raw materials, technology, goods (Giddens, 1984: 258) and so how can they be part of structure which is virtual?

[18] For an analysis of the effects of change and reflexivity in late modernity see Giddens (1990; 1992).

[19] In a note at this point Giddens refers approvingly to Bhaskar.

[20] And sound very much like Bhaskar's generative mechanisms.

[21] Giddens (1979: 78). These are taken unchanged from systems theory where they would be called multiple cause feedback loops.

[22] Nomic is a game developed by Suber (1990) to illustrate the self-referential nature of law— "only laws can make laws". In it players take turns where a turn consists of proposing and voting on changes to the rules of the game itself.

[23] This aspect of social reproduction, although not stressed by Giddens, is easily observable. As technology develops old practices die out, simply because they no longer occur and are therefore not reproduced.

[24] To clarify the difference between organizational closure and autopoiesis *per se*, the latter is simply a special case of the former. Organizational closure occurs when processes within a system become circularly linked to each other thus generating an entity that has a degree of autonomy in defining its own boundary. These processes can be any, e.g., descriptions, computations, or productions (Mingers, 1997). When the process is one of production, the systems is autopoietic (Varela, 1981). The definition of organizational closure is identical to that given for autopoiesis in the Appendix but with "interaction" substituted for "production".

[25] Mathematically, closure can be clearly defined. A particular domain of objects is closed with respect to a particular operation if the result of the operation always remains in the same domain. Thus the domain of positive numbers is closed with respect to addition but not with respect to subtraction.

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