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The magic of three

Article in *Kybernetes* · October 2007

DOI: 10.1108/03684920710827409 · Source: dx.doi.org

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The magic of three

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Abstract

Purpose – This paper aims to combine several modes of thought based on systems organization and observing systems in order to construct a model for a “designerly way of thinking”.

Design/methodology/approach – The approach is to regard design as a “groundless field of knowledge” that may source methodological insights from cybernetics, systems theory, cognitive studies and complexity theory, among others.

Findings – The focus of this research is to model an adaptive frame-of-reference that design students may use in order to construct their own autopoietic identity systems. The semantic question “How does a student obtain information about design?” is changed to a structural question “How could students acquire a structure enabling them to operate innovatively in a modern design environment?” With the backing of cybernetic principles, it is apparent that this process is not only feasible but also preferable.

Practical implications – While the practical use that can be made of any design theory is not within the remit of this paper, it is nonetheless the goal of theory to enhance the individual’s analytical and communicative skills.

Originality/value – This paper suggests an autopoietic model-for-becoming that can have the virtual potential of bringing one to understand the grey areas of human-object relationships.

Keywords Autopoieses, Cybernetes, Constructivist, Identity, Inter-relational

Paper type Conceptual paper

A cyber prescript, yet to be concluded

So, what’s this magic of three stuff?

The most difficult aspect to teaching “design” is that it does not exist, yet. To help in the construction of what can be termed “design” we have to establish a team of at least three (a cybernetic triad): you (the designer), the user, and... and then we run into trouble, for we cannot talk about the (real) object you call design (not yet, anyway). I believe that cybernetics is in the same conceptual boat, and following Latour’s (2005)[1] example I would hope that you would not make either design or cybernetics apply to anything.

You can’t be serious ...

I *am* being serious. This is a design theory class, where we talk about being human, and how people communicate. But, we also have to talk about the *third member* of the “design team”. I’m not interested in practical design ...

You simply cannot be serious ...

Why not? What were you looking for? In this class, we talk about design ...

So teach me about design and stop this ... this nonsense.

I can only agree that it makes no sense to you, now, because I cannot teach you anything, but I could ask you what it is that you want from life.



Oh, for heaven's sake, is this a philosophy or a design class? If you don't want to teach me about design I might as well leave.

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I did not say that I did not *want* to teach you, but that I *could not* “teach” you about design, which is not quite the same thing. The only thing I can do is to ask transformational questions, much like Socrates demonstrated to his young friend Meno, who asked, “. . . but what do you mean by this idea that we don't *learn* anything, and that what we call learning is just remembering?” By way of a demonstration, Socrates had Meno call over one of his young slave boys, and after what seemed like a good start to the process, said, “You see, Meno? I'm not teaching him anything. All I'm doing is asking questions” (Plato, 2005). You, on the other hand, seem to want me to supply you with some sort of easy formula for practical design, but for you to *learn* anything you must avoid copying me as the teacher, and for you to learn about a designerly way of thinking and about design innovation you must learn to avoid copying the designs in those books you got from the library.

Now I know you're joking – what other way am I going to learn about design? I heard you saying that nobody starts from scratch, from a blank page, so what on earth am I to do if I can't . . . ?

If you can't do what? Is there nothing else you can do besides simply copy what you see and hear? What if you try copying yourself?

Now you're really being facetious.

I'm sorry if it sounds that way, but that is where you have to start, so let's begin . . .

Introduction

That defining *moment of recognition*, of who and what we are, begins with the admission that *we are not alone* – if we really want to act as *homo sapiens* we have to question what it means to be wise and knowledgeable, to be able to judge. Formative moments of recognition enable us to act as sapient beings and knowledgeable selves capable of learning. We make a mistake, however, in thinking we can do so unaided, when pragmatism shows that we learn precisely because we are *not* alone. There are always the minimum of three elements at work in education, and in any environment that contains people and designed objects: the observer, the observed, and the result of that observation. It is the latter that I called the *third member* of the “design team” (above), an *as if* member at best, it being a virtual construct, but a result of the observer interacting with the observing system nonetheless. Glanville's (1997a) description of the characteristics of Pask's Conversation Theory is applicable here, in that the process of learning is described as “a process of conversation about and with Topics” and the fact that “any one Topic entails at least two others” a triad that engenders meaning. I see the observer and the observed as acting the roles of two Topics in conversation, which, by their very interaction, engenders the becoming of the third, and virtual, Topic. Design students, it has to be said, find this a problem, since they are expected to find ways of dealing with their individual creative input contextualized by socially communal creative inputs, aka a social stock of knowledge. The first thing that often happens to them is that they fall prey to the dreaded scourge of plagiarism, and although you can teach students the mechanics of technical and legal plagiarism, the question of what that really means, in practice, is not as easily understood by a first

year who has no idea of how to deal with a “normal” mixture of individual and communal input. Speaking about formative moments of recognition, seemingly based on other peoples’ work, appears to be nothing short of a ridiculous contradiction in terms.

I teach (I should really say I tutor) design theory, a third year industrial design class that is supposed to be based on, and extend, the previous two years of design history, stretching from the Assyrians to the Alessi’s of the design world. However, I have never been very good at following rules, especially educational rules. Perhaps because of the fourth year of art history that I attended as a (mature) student, a course that did not deal with just another year of history, but asked questions about the very existence of art objects, I have felt increasingly uncomfortable in teaching the design history course as outlined by my predecessor. Students surely have had enough of the factual history of design by the third year, and the need is surely for asking, what on earth do we do with this knowledge? What is it good for? There is only one answer: theory for practice, and immediately I have to qualify this: the focus of my research and my teaching is on theory creation, not on practical application. Coupled to this way of thinking is the notion of introducing, from the first year, principles of design research that will enable students to enhance their communication and presentations skills, in other words, to help them become critical and analytical thinkers. I do not “teach design” as such, and I do not teach theory-for-practice that is unproblematically applicable to practical design problems. I teach systemic thinking skills, using elements of contemporary social design problems as vehicles, and I can only do so successfully by adapting cybernetic principles of observing systems to suit a design educational environment. That is the only claim I can make, and this work will not attempt to either define the original cybernetic principles, or to justify a definition of practical design work. What it does attempt to do is follow Friedman’s (2003) guidelines for theory construction in design research:

Critical thinking and systemic inquiry form the foundation of theory. Research offers us the tools that allow critical thinking and systemic inquiry to bring answers out of the field of action. It is theory and the models that theory provides through which we link what we know to what we do.

This paper is thus an attempt at addressing the quite problematic learning situation in any design school where innovation and creativity is highly sought after, but where, at the same time, difficult social constructivist questions must be investigated and answers tried out “on the shop floor” as it were. How can a young person understand the formation of an individual and “new” (design) identity when the necessary academic and practical design knowledge can only come from someone and somewhere else? It is undoubtedly a question of the requisite combination of the “I” and the “other” that causes the problem, and that is something that students have to be taught, along with the idea of how anybody can learn anything at all. I have only one answer, and that is the use of *systems thinking* (you may prefer the term *systemic thinking*), which, like design, is everything and nothing at the same time, and already and always elsewhere. I will thus weave a story that combines what I see as the viable characteristics of both design and cybernetics as if they were one discipline, because I do not wish to distinguish between the two *ways of knowing*.

Design, like cybernetics, can and must act as an agent for transformation and change. Based on Heidegger’s notion of a phenomenological ontology in pursuit of

uncovering or disclosing the processes of *coming-into-being*, this systemic and circular mode of investigating human ontological understanding can be compared to Maturana and Varela's concept of *autopoiesis* (auto-production as applied to social systems, cf. below), which I regard as another form of disclosive phenomenological ontology. In this paper, I will focus on what emancipatory and *transformative* moments of recognition entail, and how students of design can construct their identities, *and that of their discipline*, by using cybernetic principles adapted to a design conversation. In my class, I require students to construct what amounts to models of design inquiry, based on a model of their personal identity construct. But first, why should systemic thinking be called for in design education?

The state of design education

The prevailing notion of design (and hence how design is taught) still seems to be based on a linear cause and effect process that relies on logic, rationality and scientific rigour, a very orderly practice that guarantees control and defined outcomes. Unfortunately, this can result in fixed structures protective of design "truths" and hence restrictive of thought patterns, and by concentrating on *what* is being designed and not reflecting on *why* these objects are being designed, we seem to have created a design crisis in self-conception. Design education still concentrates on styling and form-giving, but a curriculum that does not challenge students, one that makes it easy to move from logical idea to the logic of the finished form, is not conducive to development and innovation. Despite the increase in the complexity of social, economic and political structures on a world-wide scale, and the consequent increase in the complexity of designed objects, we have inherited design as an effect of the machine age c. 1851, and as a guild-oriented arts and crafts activity, something the modern world simply does not recognise anymore. Design, both as an activity and as education, must be approached from fresh vantage points to rethink and to broaden its character, and to do so a new educational structure is required. Not only do we need an understanding of the objects we design, we also need this same instructional understanding of the users of those objects and the contexts within which both function (Beucker, 2004; Formosa and McDonagh, 2005; Gedenryd, 1998; Jonas, 1999; Kapustin, 1998; Kolko, 2005; Michl, 2002; Pombo and Tschimmel, 2005; Restrepo *et al.*, 2004). This does tend to paint a bleak picture, and of course, not all design education curricula hold to this type of outmoded view, and one of the new design trends today is to focus on process instead of product, but the mere fact that these observations can still be made is cause for concern. "Perhaps design today is a reductionist parody of what should be a truly systemic activity" (Broadbent, 2005).

To rectify this situation, design education will need to concentrate on the learning process itself, which means un-learning conditioned and uncreative habits, moving towards authentic, competent and cognitive design processes and practices, generic and holistic skills and understanding, and the promotion of life-long learning and development. New educational models must allow students to construct their own learning capabilities, thus structuring their own modes of knowledge acquisition, in order to liberate themselves from programmed knowledge[2] and, instead, allow for emergence as a creative input (Albers *et al.*, 2004; Basadur in Van Patter, 2002; Beucker, 2004; Dowlen and Edwards, 2004; Gedenryd, 1998; Giaccardi and Fischer, 2005; Overbeeke *et al.*, 2004; Pombo and Tschimmel, 2005).

Is the educational landscape really in need of all this? Michael Fielding (2006), a Professor in Educational Innovation (University of Sussex), seems to think so:

We currently face a significant contemporary crisis, not just of student voice but of compulsory schooling and the social and political contexts that shape it ... [we need to] encourage approaches to student voice that take seriously the education of persons, not merely the thin requirements of an overly instrumental and ultimately diminishing schooling...

Bannister *et al.* (2001) highlight the problems students entering higher education face in terms of self-managed learning, since they are not prepared for this at school. Given the increasing scarcity of resources, teachers are expected to do more with less, which inevitably means a greater student/staff ratio. If the aim is to produce self-confident students who can increasingly take responsibility for their own learning styles and processes, then attention needs to be given to this facilitation process from (tutor and content) dependence to independence. With this type of suggested design education in mind, it comes as no surprise that Bruce Nussbaum, a previous editorial page editor for *Business Week*, has written an article that questions the integrity of many contemporary designers, especially when it comes to a question of (a lack of) sustainability, and he further asks the question, “how do you switch gears from designing for to designing with?” We may not agree with all he has to say, but the following has great resonance with a number of people[3]:

Maybe the object of design is not a finished product ... In fact, design has evolved from a simple practice to a powerful methodology for Design Thinking that, I believe, can transform society. By that I mean Design, with a capital D, can move beyond fashion, graphics, products, services into education, transportation, economics and politics. Design can become powerful enough to be an approach to life, a philosophy of life. But it can only do so when Design by Ego ends and Design by Conversation begins (Nussbaum, 2007).

How can any design education succeed in persuading a design student that design by conversation not only *is* design learning, but can become a worthwhile approach to a sustainable life? Again, my only answer is to adopt systemic thinking and adapt cybernetic principles for design usability, since even Gordon Pask called cybernetics “an art, or a philosophy, a way of life” (Beyes, 2005). How then could cybernetics enhance a designerly way of thinking?

Cooperative voices in conversation

Cybernetics and system theory both started out as ways of investigating the complex behaviour of systems, with a view to regulating their organization, with modern cybernetics expanding from a first-order, deterministic approach based on control and prediction, to a second-order, sociologically applicable analysis of human, hence variable, structures. Systems thinking followed the same path, dividing into a “hard” approach that studies observed systems, and a “soft” approach that studies living, observing systems, including observers of that system. From the various descriptions of second-order cybernetics and soft systems methodology, it seems the aims and methods are similar enough (Geyer, 2000; Heylighen and Joslyn, 1999; Heylighen *et al.*, 1999; Warren and Ragsdell, 2002), for the purposes of design, to use both as if they were a collective way of constructing:

... a conceptual framework, a body of knowledge and tools ... to make the full patterns [of a complex life] clearer, and to help us see how to change them effectively (Senge, 1990).

It follows that, what I simplistically call *systems thinking* for design, is:

... [a] methodology for tackling real-world problems [and] for exploring social reality ... the latter is not a 'given' but is a process in which an ever-changing social world is continuously recreated by its members (Checkland, 1981).

Peter Checkland's description of soft systems methodology could have been written for design, and it is thus understandable why Susan Szenasy (2003), the editor of *Metropolis*, calls cybernetics/systems thinking "the very basis of sustainable ethics, aesthetics, and processes" in design. Furthermore, and using language that agrees with both Checkland and design theory, Banathy (1996) sees systems methodology as different from the methodologies usually employed by fully described (and, really, operationally *and* environmentally closed) disciplines:

In system inquiry ... one selects – from a wide range of approaches, methods, and tools that best fit – the type of system, the purpose and nature of the inquiry and the specific problem situation.

In that sense, then, and as a conceptual framework for tackling real-world problems, I use both systems thinking and cybernetics, combined with design thinking, as teaching tools to engender new ways of seeing, much like Shotter's (1994) "practical" way of knowing that can "call out" not simply responses and reactions, but also a "stance toward our own construction of our own abilities". In this way, design theory can function very much like theories of social structuration in building up a shared stock of knowledge, and, provided it remains useful in everyday reality (theory for practice), this integrated stock of knowledge can be enhanced from many different fields of knowledge, thus, in effect, agreeing with Jonas (2004) who describes design as a *groundless field*, of necessity sourcing what it needs from many other contextually relevant fields of knowledge (Banathy, 1996).

Consequently, I can only regard both cybernetics and design as tools of perceptual/conceptual investigation, and, for the most part, as one conceptually blended (new) image schema that affords (you, me, any student) the opportunity to cover new ground, and on this "new ground" (which I will investigate as a spacetime fitness landscape, below) you can find amazing new constructions not noticeable before. The simplest example I use in class is to take off my glasses – without them (technology to aid "vision") I am divorced from much of the information available in my (classroom) environment. I might be "aware" of this information, but in such a way that I cannot react to or act on this information in an optimum way. One of the main points I try to make in my constructivist classroom is that "Considering the implications of seeing the world through cybernetic lenses can have a devastating effect on our traditional view of knowledge and the nature of things" since we have to rethink our certainties about what we can know, about the very nature of existence, and (theory into practice) how we manage to get anything done (Dooley, 1995). By deliberately performing an action (putting on my glasses), after making an informed decision, I restore my "way of seeing" (extending my natural abilities through technological innovation) which enables me (literally and figuratively) to engage with the possibilities in the environment and to "see" new things. Normal life is lived

without “cybernetic lenses”, without the aid of some enlightenment, but, given the “technology” (*any* addition to what you think is the total) of cybernetics and design, the “new” becomes inevitable. For that reason, I will use the term (cybernetics + design) cyberdesign, an expanded groundless field of knowledge that, by making me look differently *through* (and not just *at*) the descriptive problem space, removes the (logical) gaps “between one’s current state and the goal state” (Ohlsson, quoted in Langley and Jones, 1988).

The construction of one’s goal state

Boje and Al Arkoubi (2005) see the need to move beyond open systems theory, which they equate with second-order cybernetics, to a version of Bahktin’s heteroglossia (a term used to denote both the social/multi-voiced and individual use of language, the latter through appropriation), or dialogics (the new third-order cybernetics). One claim that drew my attention is that “dialogism overcomes binary opposition of signifier/signified, text/context, self/other ...”, meaning that this is an evolving narrative taking its meaning from those spaces to be found “between bodies (physical, political, social, bodies of ideas, etc.)”. This viewpoint seems to agree with David Bohm’s version of Dialogue, which stands for an image of a “river of meaning” flowing around and through people (Bohm *et al.*, 1991); this is a description of social structuration that engenders the construction of meaning. Using the concept of Dialogue, designers can “explore the individual and collective presuppositions, ideas, beliefs, and feelings that subtly control their interactions”. No surprises here then, and calling this open systems or second-order cybernetics amounts to the same thing: a democratic and inclusive way of appreciating the situation that you, as designer/manager, have been asked to help transform from the current state to the proposed goal state, although I much prefer Herbert Simon’s description of design as devising “courses of action aimed at changing existing situations into preferred ones” (Blevins, 2006).

“The third order cybernetic revolution in system theory brings us in touch with dialogic forces” Boje and Al Arkoubi (2005) maintain. What they refer to are the language forces of heteroglossia, namely the opposing centrifugal (deviation-expanding) and centripetal (deviation-counter-acting) forces. What I disagree with is that second-order cybernetics can be simplistically equated with an open system that only promotes “deviation-amplification, known as Law of Requisite Variety”, while a first-order cybernetics promotes deviation-counteraction. According to Beer (1979), Ashby’s Law of Requisite Variety is still poorly understood, a statement proven by the example above, in that Ashby’s Law contains *both* variety (deviation) “amplification” *and* “counteraction” thereby, by default, giving second-order cybernetics (my interpretation of Stafford Beer’s work) the same goal as Bahktin’s heteroglossia, and removing the need for a third revolution. Ashby (1956) made it quite clear that not only are the principles of cybernetics applicable to biological systems as well as to mechanical ones, but also the very complexity of human life makes it the ideal system to be investigated by the “peculiar virtue of cybernetics”. Ashby described his Law of Requisite Variety as *intuitively obvious*, and used the example of a press photographer (regulator) using a camera; if this regulatory system (photographer) wishes to “control” (more correctly, regulate) the variety in another system, in this case, say, 20 subjects each requiring different (focal) lens settings, then

the means to do so is to increase the regulatory system's own variety capacity, and being all too human, the photographer does so by extension – the camera he uses has to be capable of 20 lens settings (in modern day situations this variety amplification is extended even further and taken care of by a software programme in the digital camera).

Ashby was of the opinion that cybernetics could appreciably deal with complex systems, and that “the subject of regulation is very wide in its applications, covering . . . most of the activities . . . of science and life”. My particular application, used in a social constructivist design classroom, is based on an adaptation of Beer's notion of the Muddy Box recursive and regulatory principle:

Our adaptation has the adjuster (feedback and organizer) and the manager as being one person – the teacher. While the muddy box (classroom + students + questions) produces variety as a matter of course, it is the task of the feedback adjuster (teacher) to manage the system via the feedback loops, both for immediate feedback in real time, and for “delayed feedback” in terms of re-planning the input, thereby *reducing* operational variety, but at the same time the task of the teacher is to not-manage in the sense of being an adjuster organizer, whose task it is to *induce* organizational variety, adjusting the viability of the box to progress from structured solvable problems to dealing with ill-structured wicked problems. [In this classroom] Schön's Law (the least amount of control) has to include – in the light of the above – the notion of the regulatory process of *intrinsic* control, which “sees to it that Ashby's Law is automatically obeyed; therefore there is no loss possible in balancing the variety equations (Beer, 1979; Van der Merwe, 2005).

Now, there are two notions here that need to be addressed, in design terms. Firstly, there is the cybernetic construction of the Black Box (Glanville, 1997b), a description in opposition to Beer's notion of the Muddy Box, and, I believe, Maturana and Varela's notion of an autopoietic structure. The only way I can make sense of what is undeniably a difficult matter, namely communication by means of conversation between at least two parties, or cybernetic systems, is to envisage the interface or space between them as a space of emergence, a potential space, that cannot be either black or transparent, but much closer to a muddy or grey colour. Something emerges from a space of hiddenness that yet cannot fully declare itself until appropriated and used, since it is something new consisting of a blend of inputs from the self and the other. My argument is that a Black Box cannot function as an interface, unless one is satisfied with only dealing with the old-style design thinking that favours the object above all else. Design thinking in terms of user experience minimizes the role of the object – the computer's innards, the console with buttons, the latest phone/camera/networking device – and rather concentrates on the real interface design, namely the use that the person who deals with the hardware/software combination puts that object to. Here we have another triad consisting of self, other, and a space for emergence: the magic of three.

The only reason I used the Muddy Box notion for a classroom is exactly because one can then envisage this construct as outside both the observer and the observed. If you encounter a real Black Box situation it is shown you deliberately, like the fraudulent Enron case demonstrated, or you are attempting to “see” inside another person's mind, which we all know is impossible, hence the difficulty with so-called “ordinary” communication. The Black Box should not be placed over the signal, even though it is only a metaphorical construct. Do not follow the signals to their

reception-point, because you cannot truly follow, even with imagination, but, rather, watch the signals come out again, as they must (assuming some form of communication is taking place), changed, but recognisably signals. Again, the self-observer cannot be sure of an exact interpretation of these changed signals, but that is not quite the point, because in this “interface space” is where new meaning is being constructed, by the self (with reference to its original signal sent), in conjunction with the other’s re-broadcasting of that signal (the other’s interpretation of the self’s original signal), and the new emergent meaning: the virtual meaning in the virtual space of becoming between the self and the other. You see, the Muddy Box is, in fact, the interface of design education. I can readily accept each personal construct (each individual autopoietic system) as being a Black Box, *even to the self* who supposedly inhabits that emptiness. There is nothing there. But *out here* in the virtual constructs of interfacing, that is where we “are” or more correctly, where we are continually *becoming*. “The interface is observing. Where observing is, in the space between, is where the interface is” (Glanville, 1998), and in my adaptation of cybernetic principles, the Black Box can only be mistakenly constructed “When we assume the interface is ‘as if’ it were on the Object of our observing, [and] we give no space to that Object to help form that interface” (Glanville, 1998). If we mistake the interface as if it were synonymous with the Object, then “within first-order cybernetics the observed object is interpreted as a *black box* that does not disclose its mode of operation” (Glanville, quoted in Beyes, 2005). I rest my case.

Which brings me belatedly to the second notion that needs to be addressed in design terms. Glanville (1990) states “that a distinction cannot cleave a space” but he also states that “The distinction’s purpose is itself: its own becoming”. In his preface to the second half of *Autopoiesis and Cognition*, Beer (1980) wrote, regarding Maturana’s notion of freedom from the ego, that this forms a natural contradiction of autopoiesis. “It” survives, as it must, but what is this *it*? Self-preservation is the ultimate goal of any being, but this then means that the ego/id cannot be formed in complete isolation from that which it depends on – the other. Freedom from it/the ego would mean freedom from a self-centred interpretation that does not allow dialogue or that does not take others into account. Making distinctions is “making” the self; the self’s (distinction’s) purpose is itself: its own becoming, and yet it cannot accomplish this without an “external other” – a paradox for both cybernetics and design. If we can accept that the self is this very fundamental cybernetic *distinction*, then the self as *it* – as distinction – has to “cleave a space” for becoming: the triad of self, other, and virtual space where we can “observe” our distinctions-in-the-making, as it were, communicating and bartering for meaning.

Compare, then, this interactive space, this interface to Glanville’s (1997b) Black Box construct, and you will see that the observer (which Glanville rightly says includes the designer) cannot either determine the relationship between the input and output signals, nor control the Black Box situation, since the designer is always part of a triad, that magical number three: you (other/user), me (designer/self), and the product, as long as we remember that it is not the product (for itself) that forms the third element of the triad, but rather the interface design (the virtual *entirely not there* space) that plays the role of the third member of the triad. And yet, “The observer controls the Black Box ... [which] equally controls the observer ... The control ... is circular” (Glanville, 1997b).

It is this (controlling) view of cybernetics, I presume, that allow Kenny and Boxer (1990) to come straight to the point and claim that the framework of second-order cybernetics does not allow us the freedom to think and act that is necessary if we (and the problematic of self-reference) are to move beyond its paradoxical circularity. The observer (designer) does not control any box, and all the boxes in the world cannot control the observer, *as an autopoietic system*: change can only happen as an internal structural event, and not be forced from the outside. The “control” that is circular should be equated with everyday organizational management (and it is this absolutist view of the term *control* that I dislike, cf. below), and the “control” in machined systems can retain the original meaning, but “control” in human systems needs another term. Let us have another look at Beer’s formulation of the Muddy Box notion: our constructivist classroom (the scene for the Muddy Box construct) has the feedback adjuster and the adjustor organizer as the same person, who also manages everyday occurrences (dealing with real time problems in the real world). In terms of re-planning, the classroom input (derived from the signals re-broadcast by the other), this self *reduces* operational variety (otherwise chaos can result because of too much variety/playfulness/noise, *as in too much information*), but at the same time the task of this self is to not-manage in the sense of being an adjuster organizer, whose task it is to *induce* organizational variety, adjusting the viability of *The/Space/Box* to progress from structured solvable problems to dealing with ill-structured “wicked” problems. In this classroom, the notion of the regulatory process of *intrinsic control* must hold sway, which “sees to it that Ashby’s Law is automatically obeyed; therefore there is no loss possible in balancing the variety equations” (Beer, 1979). Replace the term *control* with *regulate*, and the original meaning of cybernetics (*steersman*) shall be closer to the truth of human life than a mechanistic and absolutist view. A steersman denotes a boat; that boat floats, and we can ask, floats on what? You steer from the back, with some “control” of course, but that which you float upon (depend upon) has more control in the long run than the self. Design’s cybernetic boat floats on the shared stock of social knowledge we each can have access to; this substance, as the collective other of design, has more “controlling” power than any individual can handle. There is no black box, only as-yet unknown associations and newly possible combinations of variables: these can be regulated and innovated by means of this notion of variety, but still, each self has to struggle with this process, “alone” as it were, which can be a frightening thought to a student of design.

For that reason, I can agree with Kenny and Boxer’s (1990) statement that the self-referential paradoxes of second-order cybernetics “can generate much anxiety, especially as the observer recognises that there is no solid ground upon which he may stand in order to make definitive pronouncements”, but for the purposes of design education that is exactly what is required. No solid ground, no definitive pronouncements. Listen to others, conceptually blend what you know with what you experience, and *only then* find the ground to stand on. Second-order cybernetics does not and cannot *give* you the freedom to think and act in this way, but as a thinking tool, as a conceptual instrument, cyberdesign can induce this way of seeing that leads to “solid ground”, at least until the next problem comes along:

The ambiguity surrounding observing systems begins to dissipate when we realize that SOC [second-order cybernetics] is not so much about an observer as about a self-observer ... [which is] the study of his/her interaction with the world, of which they are a part (Julià, 2000).

In that sense, Kenny and Boxer's *anxiety* should be read as necessary cognitive dissonance (Duit and Confrey, 1996), a notion similar to what Schön (1987) expects the student (designer) to experience in the "indeterminate zones of practice – uncertainty, situations of confusion and messiness where you don't know what the problem is". You cannot teach design by rote, and neither by "good example", for that will only take you so far. The truly cybernetic principle is self-steering, but to get to that point (of departure) you need to unlearn, in the sense of Socrates asking Meno:

So by making him [the slave boy] feel baffled . . . we haven't done him any harm, have we? . . . At any rate, this should have helped him towards discovering the truth. Since, now he will be happy to try and find out what he doesn't know (Plato, 2005).

In searching for design solutions, you should not look at the object but at the process (of design, of which you – the self – is the beginning part). Designers should use a paradoxical way of seeing turned into a way of knowing, and enquire about that which they do not know by looking at that which they do know, only not directly *at* but *through* what they know (Van der Merwe, 2002).

However, what I most disagree with is Kenny and Boxer's claim that second-order cybernetics "mistakenly assumes an identity between the observer and the observing process", leading them to call for a third-order cybernetics to solve this self-referential circularity paradox. von Foerster (1991) did not say we could not go on to third-order cybernetics, merely that an external-to-second-order cybernetics action would not create anything new. By immersing yourself in the creative circularity of second-order cybernetics, "One has stepped into the domain of concepts that apply to themselves", a cybernetic endorsement of autopoiesis and consequential self-discovery.

The spacetime fitness landscape that is created by cyberdesign thinking relies on observers (designers) being able to, ontologically, re-design, as it were, their new identities, and consequently that of their discipline, because change in an autopoietic system is only possible as a renewal of the internal structural dimension/s of the system, while this very change/transformation/evolution is only possible *because* of something external to the system itself (Van der Merwe, 2005), this possibility of an "identity"/identification between the observer, the observing process, and the (virtual + real) environment.

The hidden order that this scenario presumes is acknowledged by Scott (1996) in quoting the work of Gotthard Gunther (1972): "Cybernetics . . . will only attain its true stature if it recognises itself as the science that reaches out for that which is hidden", and Scott's rephrasing of Gunther's First Law as: "There is an exchange relation between knowing and being" strengthens my argument that the creation of an own identity as well as the identity/ontology of a design discipline is exactly this: the relationship between Heidegger's Dasein (everyday man) and Being (what we can become) is the same relationship between the design process (inclusive of the observer) and an evolutionary ontology-in-the-making. The "space" of the spacetime landscape corresponds to the idea of "place" (mental as well as physical space) which Heidegger (1969) reminds us used to have the same meaning as the word *end* (still used today, i.e. Forster's novel *Howards End*, and one of farmer Brown's fields called Bottom's End), and this correspondence has the sense of a continuous movement. Consider your own situation: when anything (normally) ends, it means *it* is finished, but you (the self)

cannot *end* your coming-into-being in this way, you can only find your self in a space or place, *from which* to move on, again. “Self-reference (or better, self-referring) constitutes not so much an end – an accomplishment to be formalized or simulated – as a beginning” (Julià, 2000). If an ending constitutes a beginning, and we can see that *end* thus connotes *place* (space from which to begin) it can be appreciated that convergence leads to divergence, echoed in Bohm and Peat’s (1989) notion of enfoldment and unfoldment, or implicate and explicate order. They maintain that there is *no separation* between the two concepts of order that would have any lasting meaning, thus what is implicit in the enfolded convergence of abstracted order is available and explicit in the unfolded divergence of “natural” order – or “reality” as we remember it (Van der Merwe, 2000). What is implicit in the “end” of anything is the explicit possibility of a new beginning, a moving from place to place, moving, continuously, from Dasein to Being, from *now* to *then*, with *no separation* that should make any difference.

Not only is there an *exchange relation* between your (now) old self and your (then) new self, but this same exchange relation between *knowing* and *being* “moves” you to re-construct/re-construe the fitness landscape of spacetime, but, before continuing, I must outline what this strange phrase refers to, and what that has to do with cyberdesign.

The fitness landscape of spacetime

Design, as a human activity – of thought – does not have a beginning nor an ending, proper, but it does deal with a continuous becoming. It is not the landscape of our material existence that has to change, but the complexity fitness landscapes of our own ontological and metaphysical landscape that we have to recognise as changing, because as autopoietic systems we change continuously. Furthermore, when Kauffman (1995)[4] says that “we need to paint a new picture” when discussing the relationship between self-organization and selection, I would interpret that as an injunction to re-design the relationship between self-organization (autopoiesis/*inside*) and selection (non-equilibrium/*outside*). We need to discover that there is no *outside*, and neither is there, really, an observable *inside*. The complex answer to *who we are* is to redesign, to rethink, how we become, and that happens nowhere, *and* it happens here-and-now, but not as we are used to. Not only is consciousness a wonderfully complex phenomenon, normal human beings manage to perform the most complex tasks without thinking.

To imagine our new possibilities, our new selves, it is not implausible to think:

... that life emerged as a phase transition to collective autocatalysis once a chemical minestrone, held in a localized region able to sustain adequately high concentrations, became thick enough with molecular diversity (Kauffman, 1995).

So the question is, when are the circumstances just right for a phase transition, this autoreproduction, to take place – i.e. when do you reach the point when external triggers have done enough “triggering” to begin the autoproduction process, and is it this simple? What we have to ask is what happens just before, during, and immediately after this phase transition? What did you think you were capable of before this *phase transitional design conversation*, what did you begin to perceive during the conversation, and who are you now? This type of cyberdesign conversation is a journey of discovery that concentrates mainly on crossing a gap between the now and

the yet-to-be, allowing us to “gain a foothold at another shore of reality” (Polanyi, 1962). The floating pattern of behavioural action we use as support base *is* the “meeting-place” where teacher and student may co-produce meaning *from* the environment (Van der Merwe, 2000). If we intelligently use this environment, the “hidden aspects of the unknown” can be seen as simply the known data turned pattern, clues and pointers to the so-called unknown solution (Polanyi, 1962). Based on the *here-and-now*, triggered by the *not-yet*, this meeting-place is Luhmann’s *nowhere* conversational speech bubble, the communication that speaks to communication (Metcalf, 1999).

A fitness landscape of spacetime looks somewhat like a wavefunction (which is science-speak for all the information available from a context), although Kauffman uses a patchwork quilt to illustrate this point. What he calls a patch procedure (Kauffman, 1995) is visually quite simple: imagine the space, *all* the space, that can constitute your life-world. Imagine it as a patchwork quilt, with each patch the parts of a non-serial, difficult-to-solve problem (much like life, really). He is talking about spacetime, in equilibrium, a space that contains nothing, a flat quilt with no colour and no pattern but nevertheless, there, a *something* that we use as yardstick. The minute we add things, like gravity, movement (time), attractors, then the quilt starts to react, or rather, the quilt is drawn upon, warped, becomes a landscape that is trying to change (transform) itself into a fitness landscape, but the problem is that all the patches, the squares that make up the quilt, are trying to do the same thing. “Each patch climbs toward fitness peaks on its own landscape, but in doing so deforms the fitness landscape of its partners” (Kauffman, 1995), and this happens because finding a solution or part of a solution in one patch will change the nature of the problem for another patch, through the act of networking or interconnection: we are all part of this crazy quilt spacetime landscape we call social reality.

Each fitness landscape adjusts itself to the adjacent one in the patchwork quilt of spacetime. As Kauffman (1995) states, “Patches, in short, may be a fundamental process we have evolved in our social systems . . . ” and if the analogy holds, then adjacent fitness landscapes, trying to accommodate individual fitness peaks that are not all precisely the same, collectively seen as the whole landscape, and seen as the spacetime landscape, means that the fabric of this landscape stretches/deforms – unlike the quilt with its individual patches, this spacetime quilt does not ruck up, taking away from one patch if another patch reaches a high-fitness peak and pulls towards itself more of the spacetime fabric. The social process of fitness landscaping/spacetime manufacturing more fabric, as it were, because it stretches and leaves the surrounding areas untouched but at the same time enriched. This is working with probability existence, not material existence, and if scientific spacetime creates the conditions for gravity, then any body large enough to deform spacetime is an *attractor* – any person or idea that is deemed important enough acts as an attractor in the social spacetime and gravitates towards itself other ideas and influences, quite probably proving Dawkins (2006) correct, only he reminds us that mere ideas can be these attractors, since they act as patterns of information, the new replicators he calls *memes*, further suggesting that they mutate through propagating. Price (2004) calls this a process of self-organized emergence that is fed by a discourse that contains the cultural replicators called memes, and that these carry the schemata for a complex social order in the making.

In order to manage life we abstract and simplify, but the crucial point is, complexity does not disappear in the process, it is the bedrock upon which we build the simplified structures of everyday organizational management (I dislike the word *control*, since the term denotes an inflexibility foreign to design thinking). Seen this way, social complexity, as does the cyberdesign process, goes as far as is needed for the (local) system to work properly, and no further, yet, until change is necessary, or until existing (but not used) connections need to be activated between local and global systems. Correlation with biology is again possible, because evolution through complex adaptive and autocatalytic systems means that, following Kauffman (1995), we can admit that complexity and creativity not only are linked, but that they are naturally ubiquitous, that they form the crazy quilt fabric of social spacetime, the vital ingredients for an ontology of, not only individual identity, but also that of design as a discipline.

Relating and exchanging

What we understand and what we ultimately “see” depends on what we are prepared to exchange (give something to get something else), using the social spacetime landscape. It is here that the self creates fundamental cybernetic *distinctions*, – where the self can “cleave a space” for becoming. It is here that the triad of self, other, and virtual space communicates and barter for meaning. However, this is still a social and virtual construct, an *entirely not there* space, and Scott (1996) reminds us of Gunther’s notion of cybernetics as a science that needs to make contact with that which is hidden, or as yet unseen. To Heidegger (in Dreyfus, 1991), the concept of *truth* was associated with the Greek term *aletheia*, equating *truth* with *unforgetting*, and when one *unforgets*, something is brought forth from a space of *hiddenness*, thereby equating *truth* with *discovery*. In that sense the truth of our daily phenomenal encounters can be discovered anew, every day: it simply means that the possibility of a *learning interpretation-of-disclosure* is available to anyone, and as design teachers we must bring this to the attention of students. Yet Scott (2000) questions the “constructivist epistemologies of second-order cybernetics” (quoting von Foerster, 1982) by focusing on Stewart’s call for a third domain, that of “observer valued impurities” or “how observers construe themselves as observers” (quoting Kenny and Boxer, 1992). Again quoting Gunther, Scott emphasizes that there is an exchange relation between epistemology and ontology, and that the existing cybernetics worldview is inadequate to deal with these problems. If we can imagine the fitness landscape of spacetime and its fitness peaks as these observer valued impurities, then there is no question that second-order cybernetics can deal with these problems of complexity, and that there is no need for another outside viewpoint, because *there is no “out there”*. As Maturana and Varela (1980) state, a description of absolute (outside) reality is impossible, because that would imply the observer is capable of describing an interaction with this outside reality, and the facts are that the image we would receive from this description would be mediated by the autopoietic nature of the observer’s system, making it *not* an accurate and absolute description of “out there”. How observers construe themselves *as* observers is determined by the self-conscious and self-observing behaviour of the observer, and this cognitive reality is relative to the observer (Maturana and Varela, 1980).

Yes, there is an exchange relation between “out there” and “in here” – as long as you realise that neither exists as objective realities, but are virtual constructs. Any “out there” will be a construct of your individual autopoietic system created by uncovering a space of hiddenness, in Heidegger’s sense. “Elements are elements only for the system that employs them as units and they are such only through this system” declared Luhmann (1995), but in the domain of epistemology, even if this were true, you will not find any common ground with any other “out there” (Luhmann, 1995). Observers inevitably create “impurities” but only in relation to someone else’s observations. Biologically speaking, there is no modernist metanarrative (third-order cybernetics) to neatly deal with problematic constructivist epistemologies, only postmodernist multinarratives that have to be dealt with via a completely different view of the world and of culture. Perhaps that is what Bateson (2000) had in mind when he suggested (1972) “that an entirely new epistemology must come out of cybernetics and system theory, involving a new understanding of mind, self, human relationship, and power”. I do not pretend to have a definitive answer, but I am convinced that a form of autopoietic cyberdesign can prompt, at least, some sense of what it means to be a truly observant system among other living systems.

It is here that we encounter multiple realities, and yet multiple “out there” perspectives can be dealt with through the notion of autopoiesis, a truly cybernetic approach to human understanding, because, as Bateson (2000) believes, as societies we form complex cybernetic networks, and that every “human body is a complex, cybernetically integrated system”. Maturana and Varela (1980) “claim that the notion of autopoiesis is necessary and sufficient to characterize the organizations of living systems”. Life in the form of human beings is autopoietic, which means that autoproduction takes place: we reproduce ourselves as ongoing and constantly evolving products – we are at the same time the product and the producer (Dimitrov and Ebsary, 1997; Mariotti, 1996):

Maturana and Varela introduced the idea of autopoiesis as a form of system organisation where the system as a whole produces and replaces its own components in an ongoing structural coupling with the surrounding environment... (Dimitrov, 1998)

This is a conscious interaction with the environment, while the changes sought by a living system are only possible in its internal structure. This makes an autopoietic system both open and closed at the same time, with a unique boundary that both suspends and renews the system’s relationship with its environment (Dimitrov, 1998; Maula, 2000). Heidegger (1969) called cybernetics the new fundamental science that:

... corresponds to the determination of man as an acting social being. For it is the theory of the steering of the possible planning and arrangement of human labor. Cybernetics transforms language into an exchange of news.

In terms of design education this is news, for the system (student), about its environment (the integrated cybernetic networks), and seeing that we can perceive only differences, when Bateson (2000) says that information equates with news of difference, we can argue that living systems depends on the exchange of differences.

Alienating everybody

Luhmann (1995), in his description of what amounts to an exchange of news (information), warns that “every observation must hold to difference schemata” or, to put it a different way, students of cyberdesign must learn to dissociate themselves, from themselves, a form of necessary self-alienation. Geyer (1994) believes that a certain degree of alienation in today’s complex society is inevitable, but also that the relationship between alienation and participation is not that of simple opposites. Maturana and Varela (1980) turns the question “How does the organism obtain information about its environment?” into “How does it happen that the organism has the structure that permits it to operate adequately in the medium in which it exists?” Dissociation, or alienation, from so-called reality can, through a fitness landscape of one’s own desire, uncover what real participation should mean, and reveal the relationship between the two. Teachers of design should follow Maturana & Varela’s method of changing semantic questions into structural ones, and, instead of asking, *How does a student obtain information about design*, they should ask, *How could students acquire a structure enabling them to operate innovatively in a modern design environment?* Cyberdesign is all about structure, and the structure (of understanding) that forms the spacetime landscape corresponds to the idea of “place” (above), an “end” to the old self and the acquiring of the new structure. Luhmann (1995) puts it very well in positing a structural relationship between the I and its world as congruent but endless at the same time: you can find the new structure you need in this spacetime landscape, but there are no limits and no boundaries. The circularity paradox of an observer’s self-referential *moment of recognition* is precisely what is necessary in today’s world of multi-level complexity. The other I that Luhmann (1995) says is required by reflection – translated by me as the other I that can deal with the news of difference, news of alienation – is a you (another I of the same type) that prevents any “ontological self-fixation”.

Commenting on the (then) new trend in university education of regarding students as products fashioned by the institution to better serve industry, Blacker (1993) steers away from this modern “cult of efficiency” and focuses instead on the intrinsic value of education itself. In defending what he calls a somewhat old-fashioned direction, he bases his reasoning on Gadamer’s appropriation of the interpretive tradition of hermeneutical exegesis, which, in design educational terms, I would translate as *the explanation that teaches*. In line with his stance against the “narrowly utilitarian” view of education, Blacker supports Gadamer’s claim that *education uses us*, and furthermore, that “education as *Bildung* eludes us when we obtrude too severely on its proper sphere”. If we wish to follow Heidegger into his landscape of Dasein’s possibilities and prevent Luhmann’s ontological self-fixation, we cannot but agree with Gadamer’s positioning of education as this *worldedness* within which Dasein can find what it needs to find, but only if it surrenders – more properly, offers itself up – to this potential *world-in-waiting*, thereby allowing “education to use us”. Heidegger (1962) states “that *the entity which in every case we are, is ontologically that which is farthest*”, meaning, in effect, that we will never fully attain this (doubtful) goal of irretrievably *becoming*, should, indeed, not want to finally end this quest for Being.

A cyber postscript, still not concluded

So, what's this magic of three stuff, again?

I could give the frivolous answer: you, me and baby make three, and hope you see that it is anything but a joke. Remember, we said that the most difficult aspect to teaching design is that it does not exist, yet, until you and the user (your other-self or other-designer, however, you might wish to describe it to yourself) communicate-into-being the real essence of design's purpose.

What on earth are you talking about? I can see the design right there ...

That object you refer to is not design proper, but the outer styling/giving of form that engenders the experience. I believe that cybernetics is in the same conceptual boat, and like Latour (2005), I would hope that you would not make either design or cybernetics apply to anything concrete. Let me remind you, firstly, that Latour treats human actors and designed objects (*as* non-human actors) as equal partners in the communication event, and secondly, that Actor Network Theory focuses on the interface created by this communication event. Even when dealing with designed objects directly, we should look beyond their physicality and realise the third and important member of the cyberdesign triad is the interactive space wherein the new meaning can be found. Even when dealing with physical objects they only represent the designer's understanding of the effects of designed objects on the user, and so we have roughly the same triadic formula: you, me and the new baby, the emergent solution/answer/understanding. You as the user of an object and/or system, me as the designer, represented by my designed object/designed system, and the third, most important cyberdesign element: a space for possibility ...

You can't be serious ...

Why not? What were you looking for? In this class we talk about design ...

So teach me about design and stop this ... this nowhere nonsense.

You *do* remember that I stated that I cannot teach you anything, but I could only ask you what it is that you want from life, as a designer. I also said that in this design theory class I require you to construct what amounts to models of design inquiry, based on a model of your personal identity construct ...

What? This is just getting worse ...

Hold on. Richard Boland and Kalle Lyytinen, two Information Systems researchers at Case Western University, has made out a case for using identity, process and narrative as a basis for a renewal in their discipline, since disciplinary questions "are fundamentally misdirected because they ask about the *things* that should be part of our identity rather than the *process* through which we should construct it" (Boland and Lyytinen, 2004). These two researchers, as designers of themselves *and* their discipline, believe that this new way of understanding:

... leads to a questioning of the structurational processes in which researchers are, at the same time, both representing the socio-technical world (it is our medium) and shaping it through our knowledge generation (it is our outcome).

Oh, for heaven's sake, is this a philosophy or a design class? If you don't want to teach me about design I might as well leave.

You've already said that. I did not say that I did not *want* to teach you, but that I *could not* "teach" you about design the way you seem to expect. Design understanding is not copying the other, although what you come to understand about yourself depends very much on this other of the self ...

Now you're just contradicting yourself – what other way am I going to learn about design?

I am very much afraid that the only answer I have is that you should you try copying your (new) self, through a questioning of your own structurational processes.

Now you're really being facetious.

I'm sorry if it still sounds that way, but that is the only place you can start, so let's go back to the beginning ...

Notes

1. Bruno Latour is one of the best known theorists in Information Systems dealing with Actor Network Theory, and the relationship between what he calls human- and non-human actors (people and designed objects).
2. Revans (1985, p. 11) calls learning a social process; we learn with and from each other, and thus programmed knowledge (book learning) can become inauthentic learning.
3. For a response to Nussbaum, see NextD Journal's special issue Beautiful Diversion at www.nextd.org/02/index.html
4. Stuart Kauffman is a member of the Santa Fe Institute, a research body that investigates the complexities of natural, artificial and social systems. Kauffman is one of the leading figures on self-organization.

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