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A (Cybernetic) Musing: The State of Cybernetics

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Introduction

Somethings come along at just the right time. I had decided to write about the state of cybernetics (focusing on second order cybernetics) in this issue. And then, in the last issue, there was a delightful interview with Heinz von Foerster, making the whole task easier.

In the past, I have bemoaned the way that cybernetics has fragmented and, apparently, disappeared.[2] I don't mean to repeat myself endlessly, so I'd like to start by looking at some of the more popular views of where we are, at either the start of this new millennium, or the end of this old one (depending on how you like to count). A millennium seems to me to provide a wonderful excuse to take stock, to think about what has been achieved, and what might be, so that what might be achieved may be redesignated because we see it in the light not so much of what has been achieved, as what hasn't.

But I will start with a statement of faith, to set my context. I believe cybernetics offers us insights and an approach only approximated by other fields. Especially second order cybernetics, which, to me, takes the role of the conscience of cybernetics: it's where we look at the concepts and assumptions that cybernetics runs on, or which it tries to explain, and attempt to deal with them in a manner that reflects our understandings — ie, cybernetically. That's how the cybernetics of cybernetics actually is the cybernetics of cybernetics! Therefore, I believe, there is an area (perhaps only tiny) where we care for what is at the heart of cybernetics, making sure it's healthy and growing well. It's a sort of parenting. It's a sort of polishing of the jewel. And while this may be a romantic view, it's what I believe and have worked on for the last 30 years, which I hold in a very emotional manner — my grand passion.

Yet I often find that my view of cybernetics is far removed from the views held by others, and it is these views that I mainly wish to look at in my assessment of

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[2] I will not mention Systems Theory/Systems Science and its variants. But there continues to be some difficulty in understanding how these relate. Some see them as the same, but, in my experience, those who do cybernetics think of Systems Theory as a branch of cybernetics, and vice versa. The point is that strange views are not just held of cybernetics, but between the supposedly closely related (even homomorphic) subjects cybernetics and Systems Theory, by the protagonists of each.

the State of the Art, for I think that the problems pertinent to the state of cybernetics may lie in these views, or at least how these views and mine differ.

What Others Say: The Complaints

In a recent insomniac's broadcast, Professor Kevin Warwick was introduced as Europe's foremost cybernetician. Warwick is the head of the UK's only university department of cybernetics, which is essentially concerned with advanced control systems.[3] There are some for whom this is cybernetics, but readers of this journal will have moved beyond this view.

Warwick became notorious when he had a chip implanted in his arm for a week, a couple of years ago, so sensors in his department would be activated in his presence to (verbally) welcome him and to open doors, etc. (The electronic musician Peter Zinovief proposed doing much the same in 1970: but I don't know if he did). Thus Warwick became a temporary cyborg. This chip insertion made him especially newsworthy.[4]

I do not mean to be dismissive of Warwick and those others who still see cybernetics in this way — as will become unequivocally clear at the end of this column. I don't, of course, agree with this view, because I see it as very particularised, limited and somewhat old-fashioned. I often find those who hold such a view somewhat dogmatic and exclusionist, requiring others to fit their criteria or dismissing them out of hand, rather than encouraging plurality. I think *Warwick's view* , although it is conceptually narrow, has value. The reason I bring him in is to introduce the view itself. This is, effectively, the view that Ashby formed in his *Introduction to Cybernetics*, although Ashby himself went far beyond it: that is, the control engineering view/the view of complex systems.

My question, arising from the televisual acclaim of Warwick, is why this view of cybernetics, old and non-reflexive as it is, can still be taken by the public to be what cybernetics is. How have those of us who have worked through this position, extending it into the views this journal represents, been so poor at getting our more extended view heard? For I know that Professor Warwick, himself, is unaware of these views: and that the conceptual world in which he shines, and our world, are considerably removed from eachother. We don't even appear in the same journals and at the same conferences.[5]

Consider another example. Fairly recently, I read the book *CyberTrends*, by David Brown. This book is a Munchian scream. The author argues strongly against a machine take-over (in much the way that Margaret Mead does, in her paper *The Cybernetics of Cybernetics*, with which second-order cybernetics can

[3] I am aware that the people whose views I report here are mainly English-speaking. I have met several who work in German who might be substituted. The views are general: the exemplars anglophone!

[4] There is strict quarantine for animals entering the UK, since the UK is rabies free. Recently, however, surgically inserted chips have been used as pet passports for those with the wish to travel from Britain into Europe, accompanied by their pet animals.

[5] According to his web site, his recent publications are in electrical engineering and control journals.

be said to have been officially launched). He is alarmed at the prospect of job losses, the dehumanising of life, the development of machine intelligence far greater than ours: the take over. All those old nightmares. And he places the responsibility for this fear being a realistic fear right at the door of cybernetics.

I share Brown's view of the undesirability of a lack of decent, reliable, fulfilling work, at least while we have a society such as we have, in which we are identified with and gain our social value not so much through who we are, as because of the job we do. (As a prematurely retired person, I regularly experience this myself.) But I don't share his apocalyptic vision. And the reasons have just one root: he is not talking about what we are. Brown's references (which are extensive) are soundly based in the first decade of cybernetic publication. Brown has looked at little else (except *Out of Control*, from the editor of *Wired*, Kevin Kelly). The names we know and cherish are absent. Even their work in the 50s (when, for instance, Gordon Pask was developing totally novel computational techniques such as self adaptive programming) goes unacknowledged. Second order cybernetics doesn't get a look in.

What Brown is looking at is certain possible (and, he believes, undesirable) social consequences of the Warwick variety of cybernetics. He doesn't see, for instance, (any more than Warwick does) that interaction involves partnership, and that one of the things that second order cybernetics offers us is the possibility of developing synergetically with whatever we create, to the benefit of both. He doesn't see what Heinz von Foerster pointed out in his interview/dance: that we exist to ourselves through our reflections in others. When we see machines in this way, they become partners, not overlords. I did not find one reference, or one thought, in Brown's book, that reflects the insights that second order cybernetics has been developing. And the question I want to ask is *Why*?[6]

By way of contrast, consider the view put forward in a book that is thoroughly enthused by the technological devices that Warwick is so attached to but Brown finds so distasteful: Kelly's aforementioned *Out of Control*, which is almost the catechism of Brown's objections. This book, in my opinion, occupies an ambivalent place. Kelly asserts that second order cybernetics is a reversion. It just gets us tied up in unproductive circles.[7] Kelly is, however, very excited by the toys of cybernetic systems of the older type. Yet he seems to veer dangerously closely to second order cybernetics when he extols assemblies of small, simple task-performing (more-or-less autonomous) robots which, when interacting,

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[6] *The Observer* newspaper (London) reports (Sunday 19 March 2000) that Kelly's magazine *Wired* contained an article by Bill Joy, one of the founders of Sun Microsystems, arguing points similar to those argued by Brown: *We are on the cusp of the perfection of extreme evil, whose possibility spreads to a terrible empowerment of extreme individuals.* Notice that the notion of implicit control is the first order cybernetic notion.

[7] I am reminded of Stuart Umpleby's distinguishing of the American academic from the European: the American is always interested in what can be done with something, whereas the European is less preoccupied with usefulness, more interested in understanding. See for instance the debate the American Society for Cybernetics sponsored in the 1980s concerning Utility, in their newsletter, *Continuing the Conversation*

acquire very complex and subtle behaviours. In contrast to Brown, Kelly is an enthusiast and apologist for first order cybernetics who, although dismissing second order cybernetics, nevertheless comes close to extolling it. Confusing?

My question is how does Kelly, of all forward-looking critics and impresarios, fail to see that second order cybernetics is about interaction and conversation — things that make our human lives human, and which allow us to communicate (which I hope are what a magazine publisher wishes to do).

As a positive counter-indicator, some in the field seem to think that the addition of the prefix *cyber-* to almost everything indicates that cybernetics is actually rather healthy. I have heard academics wistfully expressing the hope that the *cyber-* prefix will be the saviour of various peripheral or peripheralised societies and departments. They hope that the new culture of *cyber-* will bring recognition and resilience into the failing bodies they would so like to succeed. But it doesn't. Brown uses it dismissively in his book title. And, apart from the obvious (and silly) reason — that there's no reason imaginable why kids on GameBoys should spend money on learned societies, or as they probably seem to be, incomprehensible talking shops — there is another, and from our point of view, more serious reason. This concerns how the prefix has been press-ganged. *Cyber-* is currently the fashionable buzz prefix. It is attached to any and everything, regardless of whether it has any appropriateness, because it brings glamour. It's desirable. Call something *cyber-*, and, for the moment at least, it's right there in the forefront. Most of the cyber-this's and cyber-that's that we hear of have, at best, tenuous connections with any view of cybernetics those who work in the field might hold. Far from strengthening, the *cyber-* prefix, because it so misunderstands and/or misrepresents (second order) cybernetics, damages. I understand the argument that familiarisation through vocabulary can lead to greater understanding: but I do not generally accept it. Anyone for cyber-socks?

There is a precedent that supports my negative view of what this means for cybernetics. Loss of the subject's credibility through glamorisation and overkill is the reason I have heard given explaining the near disappearance of cybernetics the first time round. When cybernetics was new, it was hyped as the answer to everything. Just as after the Second World War, science was assumed to be all-conquering, so this new *super* science was set to be even more all-conquering. Cybernetics became a buzz word that failed to live up to its buzz. It crashed. It didn't deliver the absurd promises cyberneticians had allowed to be made for it. Many of its interests and concerns were assumed by bionics and Artificial Intelligence, neither of which is what it once was![8]

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[8] Graham Barnes reminds me that Erich Fromm made a concerted attack on *The Cybernetic Religion*, attaching the prefix cyber- to many things he did not like long before Gibson pressganged it! This was, apparently, also part of the process of attaching blame for the Vietnam War. See Fromm's book *The Marketing Character and Cybernetic Religion.*

I conclude this list of current popular views of cybernetics by mentioning the response of Professor Bill Hillier, director of research at the Bartlett School in London's University College. On being told by a colleague developing a course that he needed a (second order) cybernetics component, Hillier remarked that he thought cybernetics had died years ago! I will not dwell on this view. I report it because it indicates that none of us in cybernetics communicate well to those not in our small band(s).

Is All Lost?

Apparently, then, what you and I study no longer exists: it has died. How can this be? How did we miss its sickening, its obituaries? And, more importantly, can we do anything about this? In what state do we find cybernetics at the start/end of this millennium?

If we accept the views summarised above, the state is not very good. In Brown's view, cybernetics is to blame for virtually everything. In the use of the cyber- prefix, we see that cybernetics is really only glamour, a fashion to be worn without care or concern (and, we must presume, disposable). And in the case of Warwick and others like him (including Kelly), we are talking of fragmentation and division in the subject that leads to the narrow lack of inclusion and recognition I already mentioned: which might indicate that there's no subject there worth having. What Hillier believes could be: cybernetics, dead!

To counter this, I wish to consider these opinions from the position of one who believes in the value of cybernetics, in general, and of second order cybernetics in particular, in the hope that I can show that the state of cybernetics is not so bad. Then we who are concerned may consider what we might do to counterbalance the gross misrepresentations (as I believe them to be) inherent in these views.

What is the substance of the complaints?

Answering The Complaints

There seem to be two component streams involved. The first concerns the understanding of what cybernetics is; the second how we, as cyberneticians (the custodians of cybernetics), act towards and with each other.

Following the first stream (against the background described), we notice that at the heart of the criticisms is an understanding of control: the fear that we will be controlled by our creations; or, the counterbalancing thrill, when we control them.

But this view of control as directional is somewhat restricted and out-of-date. It is based on a first order, rather than a second order cybernetic understanding, where control is applied by one element of a system to another. Careful analysis of what happens in a control loop has shown us this is not so: control exists between the members of the system, rather than in any one of them: control is, in principle, mutual.

In turn, the concept of control which our critics are using is detached from current understandings of stability and inside and outside-ness.[9] The traditional view of stability depends on there being a reference point in relation to which the stability is measured (which may be interpreted as a goal): stability is thus always with reference to some reference point that is outside the system in which we seek to find stability. The reference point must be, in some respect, unchanging since it is against the fixity of the reference point that we assert stability,[10] which can often lead to problems of the absolute. The question is, therefore, *How can the external reference point, itself, be assumed to be stable?* The answer *is By reference to another reference point.* And thus we enter an infinite regress. We can resolve this, if we see it as a problem, by re-characterising the system such that it includes what we have been calling the external reference so the reference point's reference point is the initial system. Now we have self-reference and circularity: organisational closure. But in this case, stability is internal to the system, and cannot be properly observed from outside. Indeed, we cannot even know that there is such a reference point, such a goal, within the system — although we may (and do) postulate it. Such systems, continuing to be while, nevertheless, opaque to our glances, are perfectly familiar to us in second order cybernetics. Examples include, for instance, Maturana and Varela's autopoietic systems (and, by extension, autonomous systems in Varela's sense), Pask's topics, p-individuals and conversations, Luhmann's autopoietically communicating societies, and my own Objects (of attention) and arguments concerning the nature of Black Boxes.

Further, the criticisms I reported above (with the possible exception of Kelly's and Hillier's) seem to imply that being out of control is a bad thing; or, to put it another way, that we should be dealing with relatively small variety, deterministic systems: that is, systems that can satisfy Ashby's Law of Requisite Variety. The requirement that systems are deterministic often leads to complexity. I have explored determinism and complexity in these columns, arguing for the value of unmanageability (I will not repeat the argument[11]). Such value depends on our acceptance that what happens happens between, that is, through interaction. In the case of unmanageability, we give up the notion of control (of one member of a system by another) in order to benefit from the unmappable differences that lie between the two members. Long Live the Consequences of the Law of Requisite Variety!

Behind this criticism of out-of-control-ness is another questionable assumption made too easily by far too many scientists, probably without malice but with a resulting severe distortion in the value of what they understand. This is the assumption that the explanation is the mechanism. Explanation is a construct. We

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[9] I will examine in and outside in more detail in a future column. Thos who are impatient might like to look at my paper A Ship without a Rudder.

[10] This point is also argued in the paper A Ship without a Rudder. Fixity as used here does not have t o mean, for instance, unmoving, in a fixed location. There is a type of dynamic stability which is defined in relation to a reference point that is seen to move, itself.

[11] See my column in Cybernetics and Human Knowing vol 5 no 3.

do not discover laws of nature: we invent explanations that, through the use of mechanism, account for (much of) what we observe in a tight, repeatable and predictable manner. These explanations are precisely NOT the observations we are explaining, and the mechanisms proposed are our inventions placed in our explanations, rather than actual mechanisms in an *out-there* real world.

The second stream concerns how we behave towards each other as a group of people who at least use the same name to indicate what we study, even though it turns out that what is studied varies widely.

As a group, we are isolated from each other and from the views of others in the field who we do not agree with (so isolated, and so varying in what we study under the term *cybernetics* that Hillier's remark that cybernetics no longer exists may, on occasion, seem quite apposite). We do not behave with the generosity, open-mindedness and curiosity concerning the work of our colleagues that is appropriate and proper to scientists, academics and scholars. This leads to misrepresentation and ignorance (for instance, my ignorance of Warwick's work, and his of mine), and thus to the fragmentation and a certain self-indulgent, exclusionist self-righteousness we find in our field. And how strange: this is a tiny field concerned with the identity and integrity of wholes, yet even here we cannot talk together or make room for the other. We respect neither conversation (as the communicative embodiment of circularity) not the generosity of spirit conversation demands from us if it is to function.

I do not exclude myself from these criticisms.

In the end, there is power, the exercise of which is an aspect of control. The second order cybernetic position is not one of brute strength, as the more traditional first order cybernetic position is. That is the power of the utilitarian argument (how can I use this), inherent in the first order cybernetic position. In first order cybernetics, we define and then demand that what we have defined is done, ie, our orders are executed (thus being effective, ie utilitarian). In second order cybernetics, we negotiate and come to an agreement that may be outside the scope of what any of us had thought of on entering the negotiation. The first order cybernetic position is intimately tied up with power, which is exactly why the doomsday-merchants may have a point. The control notions that first order cybernetics advocates, tied up as they are in these concepts of power, lead to the dangers, and/or the delights, that the critics indicate, such as machine takeover. In contrast, second order cybernetics does not. In effect, then, second order cybernetics is an answer to at least the doomsday scenario: and this gives us a significant argument. Maybe, in this, lie the seeds of a response to the brute force, de facto, argument that has for so long dogged those who argue for a more generous and giving form of description, always seen as open to the forced takeover of those who disagree without giving. Perhaps this will make it easier for the permissive and inclusive view to survive in the face of the onslaught of the exclusive, *I'm right* view, although we'll have to trust each other and remain steadfast in this trust!

There are other arguments. Heinz von Foerster's ethical imperative (act so as to increase your options) is one. Another is the view implied in Occam's Razor: Essentia non sunt multiplicanda praeter necessitatem (entities should not be multiplied unnecessarily: or, in my rough English, the more general the account, the better). A better understanding of the nature of humans as constructive, generous creatures would be yet another. (You need generosity to sustain a conversation, and, unless we are all without individuality, we need conversation to communicate, as I will argue in a forthcoming paper in celebration of Gordon Pask.) This view is the complete counter view to that presented by scientists such as Richard Dawkins — who seems to believe not only that we live in an encoded universe, but also that the explanation is the actuality, the mechanism of nature — which is why I feel such antipathy to his work.

Conclusion

Yet, saying all this — even were the saying to convince the critics — may have little effect. For, even if they were to join us, our problem would be that the views they have expressed have become the popular orthodoxy enshrined in the institutional thought of our Western culture. This is what, in the final analysis, we need to tackle, if we believe cybernetics, with its radical insights, is a field worth dealing with, or even just an all-permeating force.

I shall repeat my position. We need to get our own house in order, become more open and behave with more generosity, and care more for our field. We need to express this when we talk in public. We need to recognise the threats that some see, and show the answer as coming from second order rather than first order cybernetic understandings.

We need not to be exclusionist, but to learn to talk with each other in a conversation, listening more than talking, showing our care for the subject of cybernetics is more important to us than our own personal status.

Maybe we need to change the name of the field once again, as others did when they invented bionics and AI (itself now substituted by Artificial Life) to *replace* cybernetics. And in my view, we need to keep on considering the concepts of cybernetics in a cybernetic manner, to confirm their integrity and value. (After all, noone believes mathematicians should not take care of mathematics — another generalist (meta-) subject.)

There must be other things, too, but we must at least talk. As Graham Barnes, whose insights into the problems in the former Yugoslavia are so salient and so moving (see his book *Justice, Love and Wisdom*), insists, we must keep on talking. Even when there is an impasse, you go on talking. Even when there is merely repetition of stale statements, you go on talking. The moment of danger is the moment when you stop. You do not need to agree: participating in the activity is enough to create some communication, some balance, even some trust.

I do not claim that my suggestions here are all-inclusive, or even specially good. I await the suggestions of others. But unless we do consider this and act

accordingly, I am afraid we will not only continue to be misrepresented, but that misrepresentation will help the doomsday nightmares come true. And if we just leave the ideas out there, we actively encourage this sort of misunderstanding.

Against this background, the tone of Heinz von Foerster's message in the last issue is refreshing and inspiring. Cybernetics is everywhere: it is may not be a field, but it is a force that permeates everything. Everyone works on and in it.

I love the optimism, and the idea of cybernetics, all-pervasive, a sort of guerrilla subject subverting and informing. Maybe, then, I can come to agree, that it is a force, not a field, that it exists everywhere and in everything. However, if I pursue this metaphor, then I also believe (as I have argued) that cybernetics still needs great care. For, without care and attention we risk losing its integrity, so cybernetics becomes distorted, ending up denying itself. Cybernetics is, in my view, worth the effort this would involve. We are its custodians, and it is up to us, practitioners of second order cybernetics, to care for cybernetics cybernetically. To talk in therapeutic terms, if we do not care, it will stop being true and start lying to itself.[12]

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[12] This may sound anti-constructivist. I would argue it is not (see, especially, my paper The Self and the Other: the Purpose of Distinction): what I am doing here is using a short-cut mode of expression.