DRAFT of a paper by John Wood: "Un-Managing the Butterfly; Co-Sustainment and the Grammar of Agency" paper published in the Conference Proceedings, Second International Conference on Sociocybernetics, "Designs for Globalisation and Sustainability", Panticosa, Spain, 29 June 2000

(Un)managing the butterfly;

Co-sustainment and the grammar of self

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"I never cared for life, life cared for me,
and now I owe it some fidelity". (Thomas Hardy)

Abstract
Why is the word 'sustainability' so confusing? Is it because it evokes a mixture of ancient, socio-religious beliefs and aspiration? This paper reminds us that it was coined well after the 'Limits to Growth' debates of the seventies and around the same time as 'green consumerism'. It therefore incorporates a confused agenda and borrows from the dominant but incompatible discourses of techno-science and consumer-centred economics. Implicitly, 'sustainability' is somehow synonymous with 'survival' but it is seldom clear whether 'nature', technology or capital is the prime object of (our?) sustainment. (...surely, they sustain us?) Pragmatic models of sustainability tacitly support ideas of competitive production and consumption for sustaining global well being via moderated economic growth.

Arguably, although these ideas may be identified with 'sustainable consumption' they mask obvious questions such as what sustains what, and for how long. Unfortunately it has become customary to conceive of ecological systems within transactional models in which nature is regarded as a 'resource' that can be replenished by technological means. This rather linear mindset is also upheld by western grammar of "subject-verb-object" which, as such, may fail to define the richly co-creative and co-dependent nature of ecological systems. The paper suggests that if we must use terms such as 'sustainability', we should do so as a non-temporal catalyst for local and immediate levels of action, rather than for framing long term desires at the macro level. Here, the inalienable complementarity of autopoeisis and apoptosis should legitimate what we can now welcome as 'co-sustainment'.

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Introduction

The key assumption behind this paper is that there is always a component of environmental damage associated with the manufacture, distribution, use, and disposal of artefacts. Also, within the continuing growth of consumerism, this damage ultimately defeats its assumed purpose and may eventually lead to social or ecological disaster in one or more unforeseen ways. This scenario was implicit in the 'Limits to Growth' thesis of the Treaty of Rome, and it remains an enormous problem for humanity in the early 21st century. The idea of 'sustainability' was intended to address this problem, yet incorporates fundamental inconsistencies which render it confusing or even misleading at a practical level. The paper is a brief analysis of this problem, with particular reference to the system of consumerism and its effects on the world's ecosystem.

Economy and ecology

Sustained by the dominant systems of techno-science and popular capitalism, the rise of globalised consumerism has been massive and sudden. Although their discourses are distinctly different, the two systems conspire to offer local products at the global level, and global products at the local level. This paper argues that we have no single holistic and coherent language by which to understand economics in the context of the ecological, or vice versa. In practice, although our economic and ecological systems are always linked at a structural level, they are seriously out of phase. Unfortunately, these phase differences tend to be masked by the creative adaptability of the natural order of things. In other words, ecology is a synergetic system of animate and inanimate organisms[i] that has, so far, sustained our destructive practices, usually in ways we do not understand at the time.

Speed, comfort, instant gratification

Despite the emergence of 'green consumerism' and other environmentalist developments, in the last few decades, net consumption continues to rise across the world. Indeed, widespread popular access to new technologies, coupled with ever increasing consumer expectations has increased the pace and visibility of consumption, and virtually all transactions are expected to deliver both 'speed' and 'comfort'[ii], often at any time or to any place. For example, Bill Gates has coined the term 'capitalism without friction'[iii] in the claim to faster and more leisurely ways of consuming. Yet, despite the capability of computer technology to reduce overworking, there is no evidence that it actually does so[iv, v]. It is difficult not to associate some of the causes (and solutions) for speed and over-consumption with digital technologies. Despite the environmentalist rhetoric of the 'paperless office', 'teleworking', 'quality time', and 'downshifting' we are consuming ever more paper, travelling greater distances, and suffering more from the effects of stress than we did before mobile phones and laptops became ubiquitous.

The mythology of 'growth'

It has been argued that consumerism evolved as a convenient way to de-centralise[vi] and to extend capitalism's 'self-regulation' of the supply of goods and services to an increasing number of individuals within democratic societies. The idea of economic growth has been a vital

psychological feature of this system. In the western mindset, growth seems synonymous with the good. Just as consumers became fixated by the success of popular products, so the illusion of perpetual growth was sustained. Significantly, the idea of economic growth is also reinforced at the cultural level by myths that celebrate autopoeisis, but that shun apoptosis. Arguably, there are few positive myths of apoptosis, nor is there a clear collective understanding of the need for it. This may help to explain some of the political and other difficulties encountered in reducing actual levels of production and consumption.

Growth and autonomy

The nineteen sixties and seventies saw many practical attempts to challenge centralised modes of industrialised capitalism and consumerism by experimenting with 'alternative' ways of living. Many approaches saw automated technology as a primary problem and attempted to humanise it and to de-centralise[vii] it for more local production and use. Indeed, in these experiments, the idea of 'sustainability' was not generally[viii] seen as the primary objective, however. Rather, the keyword was 'autonomy'. Much of this work was inspired by Marxist principles that envisioned autonomous ways of living that might flourish outside the direct control of corporate business and central governments. From this perspective it was difficult to imagine how the stridently growth-centred ethos of capitalism could be synchronised more closely with these eco-centric ideals.

> "An autonomous country would mean one where there would be no growth in the economy, where population size was strictly controlled, where a higher standard of living could not be expected, where resources were shared equally between every man, where freedom to act was curtailed by the need to survive." [ix]

Winners of the Cold War

In 1989, communism in the soviet bloc collapsed and, at the popular level, capitalism was implicitly identified as the only realistic option. This development coincided (within a few years) with a change of ecological ideology in which, for example, the term 'alternative' became obsolete, and terms such as 'green consumerism'[x] and 'eco-friendliness' seemed more appropriate. Around the same time, ideas such as 'sustainable development' (e.g. Brundtland, 1987; UNCED, 1992) were developed from a so-called 'needs' based approach that sought a moderate level of economic growth in the hope that the global ecology would sustain it at local levels. To be fair, it specified the satisfying of human needs on a level that would not compromise future generations. However, the outcome of this idea has caused problems. How can we quantify 'human needs' without specifying an arbitrary context or standard in cultural, social, or economic terms?

The myth of endless sustainment

When we use the term 'sustainability', we do not usually ask ourselves what sustains what, and for how long. The issues are seldom clarified. Ideally speaking, we may assume that our techno-consumerist world could endure forever, but this is never made explicit. Within the context of technologically sustained consumerism, the idea of sustainability contains a tacit promise of perfection. This idea reflects the teleological assumptions in western thought, which presuppose an ultimate state of accomplishment[xi] or a completion of our destiny. This myth is

perpetuated in the cultural products[xii] and aspirations of the Cold War 'victors' who consume more than 80% of the world's resources. More and more of us become able to consume these myths through TV advertisements and Hollywood films. They act as a significant catalyst for economic growth. Ultimately, they promise us that perfection signifies the ultimate experience in the ultimate body.

Must sustainability be seen as a temporal concept?

Consumerism's implicit promise of 'endless sustainment' is inscribed within scientific attempts to prolong human life and to maximise sensation in the immediate present. If the underlying agenda of techno-science and economics is characterised by claims to better and longer lifespans, then to be sustainable is therefore to be immortal. But if, as science tells us, entropy is forever, then 'sustainability' is unsustainable. This paradox highlights one of several problems regarding the current meaning and use of 'sustainability'. By contrast, discourses of deep green (Lovelock[xiii], 1979; Naess, 1989[xiv]; Zimmerman, 1993[xv]) appeal to a time-scale that is neither immortalising nor market-driven, but which celebrates an accord between all species.

Sustaining sales figures

What is 'sustainability' if it embraces such contradictory agendas? Tony Fry[xvi] (1999) describes how our systems of consumption encourage designers to 'de-future' products (therefore resources) in order to raise expectations of 'need' and, thereby, to increase sales. As I have suggested[xvii], the more we become used to living euphorically 'for' a future moment of consumption the more we ignore the vital co-dependent relationship with our artefactual past. This is how we make ourselves deaf to the present and blind to the local.

The past sustains us in the present

Fry reminds us that we are sustained by the past in the present, and argues that, if we (designers) wish to understand our role in this stampede towards oblivion, we must first address our misconceptions of ontology, time and causality. For example, Henry Ford's design for the first mass-produced car cannot be regarded merely as a one-off event in the past, because of its ongoing capacity to sustain our lifestyles and expectations in the present. It continues to expand into multiple present/s on a number of levels such as the ongoing development of emergency surgery techniques, commuter lifestyles, housing policies, habits of courtship, road rage, etc., etc.

Self-organising Taylorism

In 1991[xviii] I warned that the new digital technologies were likely to bring about a potentially addictive mode of shopping in which an online customer's predelictions and weaknesses could be evaluated and used as the basis for individually tailored advertising. I suggested that such a system – if attached to online shopping - could produce conditions of alienation and psychological dependency. With the advent of CGI[xix] technology it is not too far-fetched to imagine an automated advertising system[xx] that is even more effective than any created solely by human judgement. Moreover, the drive to production and consumption is sustained increasingly by portable and networkable devices of communication and organisation. Such

products continue to inspire new modes of semi-voluntary work in which the traditional boundaries between consumption and production, leisure and work are blurred. I have argued elsewhere[xxi] that this process can be seen as a self-organising mode of Taylorism[xxii].

A practical example

But if all consumers were to choose 'greener' products, would the world become 'sustainable'? This seems unlikely. It is even conceivable that some 'green' products could have a worse overall impact than the ones that they replace. For example, the 'Smart Car' boasts a fuel consumption of 58 mpg and is less than three metres long. Its sales literature emphasises mobility, safety, fashion style, and economy. Even though its advertising campaign makes no mention of 'sustainability', this car clearly has a 'greener' appeal than its more traditional ancestors do. However, as almost twice as many of these vehicles can now be parked in congested streets, many families may therefore be tempted to own two or three vehicles instead of one or none. The long-term effect may be to raise consumer expectations still further and to worsen the net environmental damage.

The economics of Nature

In the above terms, the popular understanding of 'sustainability' is therefore misleading and potentially dangerous. However, if we try to think of nature merely as a finite economic resource then the mindset behind the idea of sustainable consumption becomes clearer. Heidegger's (1978) term for technology as a 'standing reserve'[xxiii] is applicable, here. That fuel runs out is apparent to all car owners. Every year we burn the equivalent of a million sunlight years of energy. We consume non-renewable fuels until our 'standing reserve' has gone. Surprisingly, we share no rational myths or beliefs to justify this behaviour. Although our oil reserves are partly sustained by the (much smaller) intake of sunlight, our habits are 'sustained' by a collective faith in the potency of future technology.

Green products

This becomes clearer when we audit particular commercial products to discover their likely environmental impact during their estimated lifespan. This is achieved through a comprehensive auditing process called 'LCA' - Life Cycle Analysis, or Life Cycle Assessment. It provides a way to map the resource implications for every stage of manufacture, distribution, consumption, and re-use/disposal. What responsible citizen would oppose such a sensible approach to design research? Sadly, the advent of 'green products' created huge new markets and led to a relaxation in public anxiety for the environment. Products 'survive' in the global market for a variety of subtle reasons, ranging from ethical issues to price tags. Where the range of consumer options is increased, consumers can choose how 'environmentally sensitive' they wish to be. Hence, whilst some popular products are more wasteful and have a shorter life than their predecessors, others are designed with a 'green' appeal. Importantly, the supply of every category of product is merely part of an endlessly diversifying market that maintains stability within the economic system.

Individualised competition

We understand capitalist economics as a system driven increasingly by competitive individualism[xxiv] in which entrepreneurial innovation is encouraged. As such its outcome

becomes evaluated by the indirect consensus of consumer choice. Crudely speaking, globalisation ultimately points to a state of endless commercial competition between every working person on the planet. In the imperatives of ever-increasing sales, design and manufacture is likely to find more customers by inventing increasingly personalised products. In the current trading context this process usually entails bulk purchasing on a global scale, and distributing to the local in many places. On the other hand, web-based shopping and out of town supermarkets have proliferated rapidly in the last decade. Ironically, one can often find vegetables of poor quality in small rural shops, whilst some consumers browse the Internet for foodstuffs from thousands of miles away and have them delivered to their homes.

Analytical logic

Over the last few hundred years, science has developed powerful conceptual tools that led to new technologies of manufacture and automation. In particular, these techniques enabled us to map complex situations by separating them into distinct component features. As a result, they tended to polarise concepts such as 'time' and 'space', 'energy' and 'information'. We thereby adopted expedient conventions such as the idea of individual channels of communication in which 'data' moves discretely from 'A' to 'B', and/or vice versa. Whilst this mindset (e.g. Shannon and Weaver) has led to many expedient engineering innovations, it has also inspired formative theories of language (e.g. de Saussure) that foster a linear description of non-linear systems.

Expectations of linearity

The familiar idea of 'feedback' as a signifying stream (i.e. data) that can be categorised as either 'positive' or 'negative' may easily deceive us into thinking that the world is regulated by simple unidirectional highways of flow and return. Moreover, it also reinforces the simple Newtonian idea of linear time that has been so important to our culture of 'speed' and 'efficiency'. Although chaos theory, quantum mechanics, connectionism, and second order cybernetics has enriched this map, the application of Newtonian[xxv] 'laws' still plays a vital role in delivering speed and comfort to the consumer.

The world is manifold

We have become so accustomed to emphasising the unidirectional flow from 'natural resources' to consumers that we may easily forget that everything in the world is always interdependent at an ecological and informational level. In the consumer culture we have come to assume that a given product delivers up its functionality to the consumer in a one-way flow of information. Designers and technologists, for example, have tended to account for the act of making or consuming principally in terms of the transformation of the product itself. This is a dangerously reductive model of how we inhabit the world of commodities. Indeed, the role of the product is only one aspect of a complex interplay between desire and satisfaction that simultaneously changes producer, consumer, product, and everything associated with them.

Autopoeisis and apoptosis

It may be helpful to theorise consumption in terms of a balance between autopoeisis and apoptosis because it may help us to understand consumerism in a less linear way. First, we should remember that an alternating condition of autopoeisis and apoptosis attends all living

organisms.[xxvi] This process is an endemic part of ecological and economic systems in the sense that all things grow and develop at the expense of others. It therefore follows that they also expire as the means by which other things unfold. In this scheme of things, the death of some parts of the organism is just as important as the birth of others.

The limits of reproducibility

The many levels upon which it takes place further complicate this process. Hence, we may find that particular economic or social factors develop and decay at rates that are different from that, say, of the ecological factors that attend the same basic system. This means that it may be possible for one feature of the system to be reproducible[xxvii] whilst another part has exhausted the limits of its reproducibility. At the beginning of the 21st century we may note, whilst that the social domain remains reproducible, the ecological domain is already beyond reproduction at current levels of industrial practice[xxviii].

The ethics of selfishness

On the other hand, the era of consumerism has engendered a more unidirectional understanding of consumption in which there is a clear asymmetry between strong and conspicuous 'consumer rights' and undeclared, or non-existent 'consumer responsibilities'. This imbalance is hardly surprising, given the historical factors that surrounded the development of individual human rights in the west. It is unfortunate that this model adapted images of sovereign personhood[xxix] for its inspiration. The idea of extrapolating from royal privilege to common citizenship was a clever legal expedient at the time, but contains obvious limits in terms of resources. However, the newly perceived importance of the individual was a core element of Adam Smith's 'commercial' society that saw itself as a number of individuals free to make transactions within limits set by government. Arguably, these factors produced a partial altruism of selfishness, perhaps first rationalised by Dr. Johnson who declared that, by spending our money, we are providing work for others.

The rationalisation of ethics

Habermas has argued that our lives have become dominated by rational factors that merely give us opportunities for choice, rather than an emotional freedom for action.

> "…But while instrumental action organises means that are appropriate or inappropriate according to criteria of an effective control of reality, strategic action depends only on the correct evaluation of possible alternative choices, which results from calculation supplemented by values and maxims."[xxx]

This highly rational notion of ethics is also exemplified in the idea of Utilitarianism, which is famously epitomised in Francis Hutchinson's assertion: "That action is best which procures the greatest happiness for the greatest number of people." Jeremy Bentham described this as a 'sacred truth', and it has echoes of Christian (and other) ethics. Bentham's 'narrow' Utilitarianism is meticulous in its quest for accuracy and quantified correctness. His 'felicific calculus' is an attempt to quantify 'happiness' within parameters such as 'fecundity', 'intensity',

'duration', etc. Lincoln Allison[xxxi] refers to a 'broad utilitarianism' when he argues that most of us underpin our 'green' (ecology-centred) ethics with 'grey' (human-centred) ethics. He defines the green approach as revering the planet as though it had rights of its own. He defines the 'grey'ethics as interpreting our activities only within the rational criteria of efficient use.

The balance between individual and collective self

It is often claimed that the imperatives of consumerism have made us more selfish. In a western, post-environmentalist age it is possible that we will rationalise our selfishness in some way or other. Festinger[xxxii] (1957) uses the term 'cognitive dissonance', to argue that we are always striving for 'consistency' between our desires and the conflicting information that we encounter in satisfying them. Sloterdijk (1988) traces out a more cynical process of rationalisation, which he calls 'enlightened false consciousness'.[xxxiii] In Japan, by contrast, it is interesting to note that many citizens feel duty bound – as did Dr. Johnson - to spend more on consumer goods, in the belief that they are promoting a healthier economy for all. Arguably, the result is the same. This raises an interesting question about the status of selfishness, in regard to the question of economic and ecological well being and our place within the whole.

The nature of altruism

Just as Darwinian thinking (e.g. Dawkins, [xxxiv]) portrayed selfish behaviour as the dominant nature of 'Nature', so the political ideologies of utilitarianism became a justification for the selfishness of consumerism within capitalism. Here, it may be helpful to explore the notion of altruism, which, as Hazel Henderson[xxxv] reminds us, is irrational within conventional economic terms. From an evolutionary perspective we can define altruism as behaviour that enhances the personal genetic fitness on the part of the altruist; "the altruist either reduces its own survival capacity, or curtails its own reproduction, or both".[xxxvi] It is usually described from an individual-centred perspective. E.g.: single hunter kills small animal - many go hungry. A single hunter kills a large animal - too much to eat. Here, the rationale of reciprocal co-operation would argue that co-operation is deferred.

The Nature of economics

It is well known that Darwin incorporated the economic thinking[xxxvii] of Adam Smith in his theory of ecological evolution, and there have been recent attempts to introduce a more ecological view of how economics works.[xxxviii] In recent years, the new 'game' of ebusiness has provided illustrations of certain new strategies, which begin to be more like those of complex organisms. This is likely to be a long learning process, because we are still in the grip of a Darwinian mindset. In his best-selling management book, James Moore suggests that: "Leaders who learn to understand ... ecology and evolution will find themselves equipped with a new model for devising strategy, and critical new options for shaping the future of their companies"[xxxix]. Nevertheless, even despite the deepest similarities between economic and ecological systems, they are likely to work in opposition to one another in subtle, but crucial ways.

Reciprocal altruism

One reason for this conflict may be the way that (western) theories of competition versus co-operation have tended to privilege individualism. An example of this mode of logic is the rational argumentation that has attended the 'prisoner's dilemma' (e.g. Parfit[xl], 1981) in which self-seeking rationalisation is optimised to accommodate the mindset of the Other. For example, Trivers[xli] (1971) uses the term 'reciprocal altruism' to mean what he calls 'Good Samaritan' behaviour in human beings. Someone is drowning and a passer-by jumps in to save them. Trivers claims that this is not 'pure' altruism because the drowning person probably has a much higher chance of drowning than that of the person who jumps into the water on his/her behalf.

Tragedy of the commons

Using a similar approach, Garrett Hardin (1968)[xlii] rationalises how the balance between individual over-consumption and environmental recoverability becomes compromised in conditions of higher population. When populations were low, he writes, areas of common land were effectively limitless and little damage could be done to them. As populations grow, pressure on the commons increases to the point where rational maximisation by individual families results in devastation for all. Hardin suggests that each herdsman rationalises his predicament and tries to balance his individual (i.e. local) needs and his duty to the (global) society at large.

	individual's viewpoint	society's viewpoint
GAIN	+ 1	0
LOSS	$-\frac{1}{n}$	$-\frac{1}{n}(x\ n)$

Figure 1 - A chart of the relative benefits to individual and society

What would the effect of adding one more animal to the common land? (See figure 1) In the herdsman's mind, he argues, the negative social effects of just one animal will be negligible, but the personal advantage to him and his family will be significant. This is what he calls the 'tragedy of the commons'. Hardin proposes that the only solution is for humanity soon to give up the freedom to unlimited family sizes. This is a fundamental truth that applies to a wide range of situations, and Hardin's principle also applies to today's ethics of environmentalism in which there is unlikely to be an immediate and perceptible payback from an autocratic act of environmentalism, except, perhaps, in terms of one's reputation and status. A temporal version

could also be devised in which 'individual' and 'social' gains and losses are replaced with 'short-term' and 'long-term' benefits or problems. It is fairly easy to see how Hardin's model can also function in positive, or negative feedback modes, for the attainment of the good, or for the avoidance of harm, respectively.

Emergent properties of Hardinism

For example, we may realise that a small, self-sacrificing gesture can produce larger benefits in specific cases. The donation of small gifts that are destined to be aggregated for the good of others has sometimes been called 'charity'. In a more commercial context, the quality and sincerity of a company's actions over a long period of time produces what we call 'good-will'. These are examples of aggregated Hardinism in reverse. Obviously, irrespective of the level on which we may interpret Hardin's maxim, it is important to acknowledge a general summation of all the incremental effects that it produces within society. In toto, it becomes a morphogenetic system that politicians try to regulate with clumsy political and economic instruments.

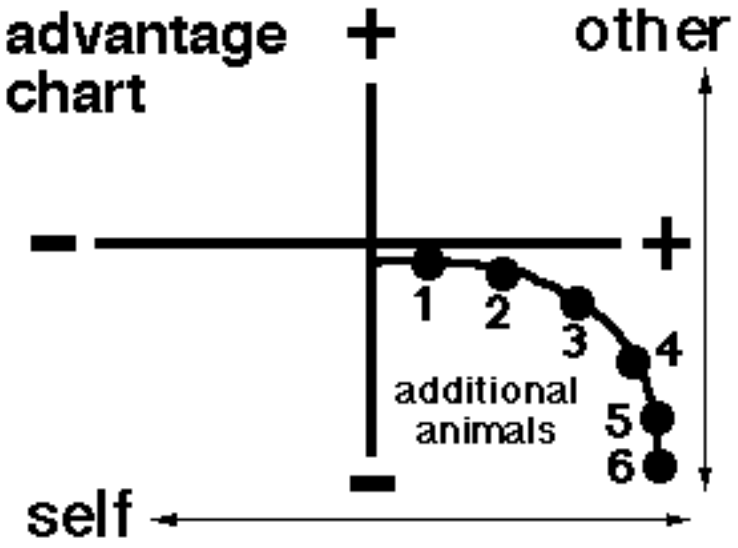

Figure 2 - Number of cattle to be grazed on common land by one individual
(But this does not take into account the fact that others will do the same)

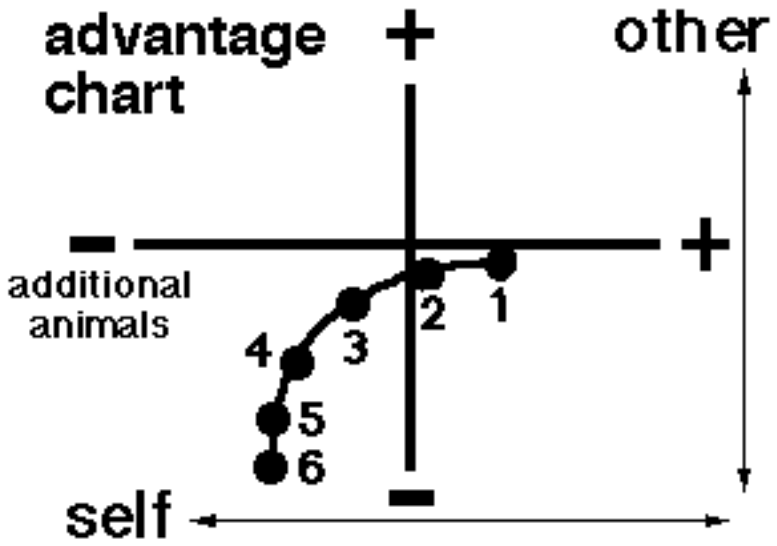

Figure 3 - Number of cattle to be grazed (assuming that others will do the same)

Unconditional altruism

If 'co-sustainment' is a necessary refinement of 'sustainability' that must move us beyond the expectations of a unidirectional flow of power to the individual, then we must reframe the mechanisms of self-help in a less rigid understanding that accommodates reciprocal flow, birth, and death. It is unfortunate that global economics produces such vast precessional inefficiencies in terms of energy wastage and damage to the ecosystem, because this is the system we are sustaining now. In redefining the popular idea of 'sustainability' in a more ecological, less economic context it may be advisable to consider how we may increase the efficacy of all 'transactions'. One solution is an ancient religious idea of 'unconditional love'. This is probably too complex and diffused a term to introduce in this context. Moreover, it is debatable whether it is readily applicable within Hardin's conditions of scarcity. However, within the economically prosperous conditions surrounding e-commerce, we have witnessed the emergence of what Richard Barbrook[xliii] calls the 'gift economy', in which short-term profits are suspended in order to provide 'free' services to long-term consumers. Perhaps this is an important development in capitalism, especially if this 'conditional altruism' can, on balance, reduce the collective anxiety that causes overproduction and over-consumption.

Autopoeisis is always part of reciprocal change

How should we avoid unidirectional, linear models of sustainability, and begin to re-think the idea of co-sustainment within the context of a globalised economic system? To some extent this may have to be framed in a way that exceeds, or transcends the conventions of market forces. John Ruskin[xliv] romanticised the strongly satisfying rapport between a craftsman and his task. We may recognise this through our own experience of any process in which our absorption in the task gives us a sense of pride – i.e. it transforms the craftsperson. This process

reaches its peak at the same time that the product is completed. At this moment the product is now ready to take its place within the existing order of things. In this reciprocal process we find an integration of creative actions, experiences, and natural processes. An interesting counter-example might be the act of creating graffiti on a wall in a public space. In a similar way, the act creates, or reaffirms the self of the artist, at the same time that it (re)creates the wall on which the autograph is formed. Phenomenologically speaking, the wall, the graffiti, and the artist's identity are simultaneously co-sustained by a single public act that is neither wholly altruistic, nor wholly selfish.

Altruistic selfishness = selfish altruism

As this paper has suggested, we have tended to regard the dominant idea of altruism[xlv] as a western term for selfless individualism. This may be unhelpful. Maturana and Varela, for example, refute the individual-oriented views of Darwin and others, pointing out (1987[xlvi]) that there is a structural complementarity between actions which are 'altruistically selfish', and those they call 'selfishly altruistic'. Ideally speaking, the term 'sustainability' could be seen as a catalytic descriptor for co-dependent and co-creative relationships between humans or between humans and non-humans. Arguably, in the light of Hardin's argument, only by increasing the sympathetic (rather than an empathetic) bond between humans and other creatures will we attain a mutual sustainment in conditions of reasonably high population. This will require a deep, collective understanding of the role of economic growth as a threat to immediate, universal mutual sustainment, rather than as a means to future sustainability for the status quo.

John Wood
2000

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[i] Lovelock, J. Gaia: "A New Look At Life On Earth", Oxford University Press, 1979/87

[ii] Wood, J., "Temporal Alienation", paper given at the Doors of Perception 4 ("SPEED") conference, Amsterdam, November 7-8, 1996

[iii] Gates, Bill, "Business@ the Speed of thought; using a digital nervous system", Time Warner, 1999

[iv] Landauer, Tom, "The Trouble with Computers", Bradford / MIT, 1995

[v] Wood, J., In a talk given at the ICA, in London, 2/11/98, I argue that the digital computer evolved from a hybridisation of the clock and the book. The fact that the 'clocked -book' is now networked to all other 'clock-books' means that the global workplace will tend to synchronise the speed and efficacy of the whole system. (http://futures.gold.ac.uk/IDEAbase/ICAtalk.html)

[vi] For example, Raven, J., "The New Wealth of Nations; a new enquiry into the nature and origins of the wealth of nations and the societal learning arrangements needed for a just society", Royal Fireworks Press, Bloomfield Books, New York, USA, & Sudbury, England, 1995, p.

[vii] Wood, J., "Could Tree Farming Answer World Food Needs ?" a chapter in the "Handbook of Radical Technology" editor Peter Harper, The Undercurrents Partnership, 1975

[viii] Perhaps with the exception of the 'Permaculture' movement in the late 1970s, which was conceived as a system of 'permanent agriculture'

[ix] Vale, R. & B. - The Autonomous House 1975 Thames & Hudson

[x] Elkington, J & Hailes, J. "The Green Consumer Guide: From Shampoo To Champagne", Gollancz. 1988

[xi] Blanchette, Oliva, "The Logic of Perfection in Aquinas", in "Thomas Aquinas and his Legacy", edited by David M. Gallagher, The Catholic University of America Press, 1994, USA

[xii] This is merely my opinion, based on a casual survey of commercial films and texts.

[xiii] Lovelock, J. Gaia: "A New Look At Life On Earth", Oxford University Press, 1979/87

[xiv] Naess, A., "Ecology, Community and Lifestyle", Cambridge University Press, 1989

[xv] Zimmerman, M., E., "Heidegger, Buddhism, and Deep Ecology", in "The Cambridge Companion to Heidegger", ed. Charles Guignon, Cambridge University Press, 1993

[xvi] Fry, Tony, "A New Design Philosophy; an introduction to de-futuring", University of New South Wales, 1999

[xvii] Wood, J., "Re-designing the Present", a chapter in "The Virtual Embodied", (John Wood, editor), Routledge (London and New York), 1998

[xviii] Wood, J., "Pay and Play", Article in Design Journal International, August 1991

[xix] Common Gateway Interface systems are situated on the key server computer on a host's network. They are programmed to tailor their data to match criteria that is already known, or that can be elicited from, the client visiting the network.

[xx] Indeed, this kind of situation already occurs with the automated design of microchips. Neural Net technologies are famous for providing solutions that are not fully understandable using symbolic logic.

[xxi] Wood, J., "Situated criticism and the experiential present", Journal of Design History, editor Prof. Nigel Whitely, April 1997

[xxii] Taylor, F. W., "The principles of scientific management", New York: Harper, 1911

[xxiii] "The revealing that rules in modern technology is a challenging which puts to nature the unreasonable demand that it supply energy which can be extracted and stored as such." in Heidegger, M., "The Question Concerning Technology", in "Basic Writings", ed. David Farrel Krell, Routledge and Kegan Paul, London, 1978, p. 296

[xxiv] "Heaven helps those who help themselves' is a well-tried maxim, embodying in a small compass the results of vast human experience. The spirit of self-help is the root of all genuine growth in the individual; and, exhibited in the lives of many, it constitutes the true source of national vigour and strength. Help from without is often enfeebling in its effects, but help from within invariably invigorates." ("Self-Help" by Samuel Smiles, 1859)

[xxv] It is ironic that Newton once governed the Royal Mint.

[xxvi] As Heraclitus said: "This world...is an ever living fire, kindling in measures and being extinguished in measures", in Barnes, J., "The Pre-Socratic Philosophers" vol. 1 Routledge and Kegan Paul, London, 1979, p.67

[xxvii] Yamaguchi, K., (editor) "Sustainable Communities in the Information Age: visions from futures studies", Adamantine Press, UK, 1997, p.

[xxviii] Meadows, D et al. "Beyond The Limits: Global Collapse or A Sustainable Future?", Earthscan. 1992

[xxix] Interestingly, the old European adage "the customer is always right" is echoed in the modern Korean expression "the customer is king", and in the Japanese expression "the customer is God".

[xxx] Habermas, J., "Towards a Rational Society", Boston, Beacon Press, 1971, p. 91-92

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[xxxii] Festinger, L., A., "A Theory of Cognitive Dissonance", Stanford University Press, 1957

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[xxxiii] Sloterdijk, P., "The Critique of Cynical Reason", London: Verso, 1988

[xxxiv] Dawkins, R., "The Selfish Gene",

[xxxv] Henderson, Hazel, "Paradigms in Progress; life beyond economics", Adamantine Press, UK, 1993

[xxxvi] Wilson, E., O., "The Genetic Evolution of Altruism; psychological and sociological principles", chapter in "Altruism, Sympathy and Helping", edited by Lauren Wispé, Academic Press, New York, London, 1978, p. 11

[xxxvii] Smith's idea of the 'invisible hand'

[xxxviii] Lewin, Roger, “It’s a Jungle Out There”, New Scientist, November 29 1997

[xxxix] Moore, James, "The Death of Competition: Leadership and strategy in the age of business ecosystems", Cambridge, Massachusetts

[xl] Parfit, Derek, “Prudence, morality, and the Prisoner’s Dilemma”, 1981

[xli] Trivers, R., L., "The Evolution of Reciprocal Altruism", Quarterly Review of Biology, 1971, 46, (4), 35-57 quoted in Wilson, E., O., "The Genetic Evolution of Altruism; psychological and sociological principles", chapter in "Altruism, Sympathy and Helping", edited by Lauren Wispé, Academic Press, New York, London, 1978, pp. 33-35

[xlii] From Garrett Hardin, 'The Tragedy of the Commons' in Garrett Hardin and John Baden (eds.), Managing the Commons (San Francisco: W. H. Freeman and Co., I977) P. 20, 28-9 (first published in Bioscience, 162, 1968). Also in Dobson, A., (ed.), "The Green Reader", Andre Deutsche, 1991

[xliii] http://www.nettime.org/nettime.w3archive/199810/msg00122.html

[xliv] Ruskin, John, "The Nature of Gothic", from "The Stones of Venice", 1851-3, quoted in "Nature and Industrialisation", ed. Clayre, E., Oxford University Press, (Open University) 1977

[xlv] altruism, as distinct from 'empathy')

[xlvi] Maturana, H., & Varela, F., G., “The Tree of Knowledge”, Shambhala, Boston & London,1998 (1987), p. 197