Creativity & Biodiversity: Towards a Synergy-of-Synergies

John Wood
Emeritus Professor of Design,
Goldsmiths, University of London, London SE14 6NW

Abstract
The paper argues that, in order to curb the current acceleration of species losses, a massive systemic change is needed. However, we are unlikely to achieve this with current methods. Paradigm change includes the need to rethink the prevailing 'realities' and governances upon which the current paradigm depends. As designers are expressly trained to 'think creatively' this paper argues that their methods might usefully augment those used by scientists and politicians. However, as these design methodologies evolved as part of the old paradigm they, too, need to be re-designed. The paper explores some research into 'metadesign' - a non-hierarchical, self-organizing framework for practice that helps designers to re-design their own mission and working vernacular, when required. In work that began in 2002, instead of seeing design as the process of creating products and services, we sought to cultivate 'synergy' at many levels. However, synergies tend to operate outside familiar boundaries of language and custom, which means that metadesigners must develop a metadiscourse, with which to explore each new predicament. This process encourages the radical 'relanguaging' of purposes, roles and self-identities. Although, in the hierarchical sense, this makes these tasks 'unmanageable', politicians can facilitate local change by encouraging citizens to cultivate a 'diversity-of-diversities'. This would act as an attractor to hitherto unforeseen orders, entities and configurations. It would offer an interoperable framework, within which communities could self-orchestrate a more complex, and emergent, 'synergy-of-synergies'.
Keywords Biomimicry, Biodiversity, Co-sustainment, Creativity, Ecomimicry, Languaging, Metadesign, Paradigm, Sympoiesis

1 The 6th Great Extinction

'Economies of scale' is a term that emerged from many imperialistic enterprises over the last five or ten thousand years. While it probably started with the invention of agriculture, humans later applied it to the building of heavy structures and the management of large bureaucracies and manufacturing plants. But the discoveries that led to these achievements engendered a presumptuous mode of formalism that migrated to many other disciplines, including engineering, education, business and economics[1]. While it has facilitated rapid population growth and made many lifestyles more comfortable, it has also led to environmental pollution, habitat destruction and biodiversity contraction. Hence, while politicians

compete with one another to squeeze yet more 'efficiency' and 'productivity' out of a damaging and dysfunctional economic system, the rate of species extinctions is rising. Some distinguished scientists, such as E.O. Wilson, warn that, over the next few decades, this could rise to 10,000 times the 'background' rates. Although an event of this magnitude would probably be fatal for human beings, it would not be without precedent. Richard Leakey's term '6th Extinction'(Leakey & Lewin, 1996) gives a 600 million year context to what is happening now. If these experts are right, our offspring could witness a halving of the number of living species by 2100, thus putting the survival of Homo Sapiens in grave doubt. This should not be surprising. From this perspective, systems of biodiversity seem less manageable, useful or attractive than monocultures. This approach has made a global force majeure more likely, probably in the form of violent climatic changes and agricultural failures. Known remedies are likely to be too weak or inapplicable because they reflect, and uphold, the paradigm that caused the malady. In short, whereas Nature is a system that operates on an 'ecologies-of-scale' basis, we have sought to manage it using an 'economies-of-scale' approach.

2 Dysfunctional Governance

In order to address these problems, a more systemic and ecomimetic model is required. As systemic changes would need to be self-inclusively regulated, at virtually every level, this calls for a more joined-up, self-reflexive and innovative approach. In other words, we need to introduce a second-order cybernetic system[2] in place of the, largely first-order, system that is in place. Rather than following existing approaches, our 'metadesign' methodology is intended to help us understand how to adopt an 'ecology-of-scale' approach[3-4]. Most human societies are accustomed to a top-down system of government in which the management of major crises are seen, primarily, as the duty of politicians, scientists and civil servants. In the 1990's, concerned by the apparent inability of NGOs to influence radical changes in behaviour, Donella Meadows (1997) found that the most familiar measures were the least effective. This is probably because those most commonly used were bureaucratic (i.e. targets, subsidies, taxes, legislation) and, therefore, the least direct. Again, the formalism implicit in these processes can be traced back to Aristotelean and Pythagorean logic[1]. While many regard these as axioms of truth, their dependability is largely epistemological. By contrast, living systems are less predictable because they are a great deal more complex and distributed. Even the setting, and attaining, of targets can be a dispiriting process, especially when they are politically ambitious or controversial. If they are set lower than what is required, they may not easily be reached within the agreed timescale. Moreover, when targets are missed (this is not uncommon), the morale of the parties involved may be reduced, thus creating a

positive feedback loop that can trigger, or amplify, a shared sense of futility in the mission. In seeking to think beyond this kind of sub-optimal system Meadows looked for what she called the 'levers of change'[5]. She noted that it is important to identify, and to reframe, the agreed purpose of a given paradigm in order to change it. This lesson has yet to be adequately acknowledged and applied by governments, who persist in applying a targets-based approach. However, in 2010 the Nagoya World Biodiversity Summit sought to move beyond the customary agenda of deepening scientific knowledge and raising public awareness. It also agreed to assign large regions of land and the sea to act as regions of wilderness, in order to give endangered species a chance to recover. Unfortunately, it soon became clear that the plan would fail[6] because the natural rate of species replenishment in the wild is too low to reverse the current rate of losses.

3 The Role of Science

It seems unlikely that applying current, hierarchical, top-down remedies for biodiversity losses will be effective within the timescale we have. Instead, we might start by differentiating between, then merging, the functions of scientists, politicians and designers, as their respective professions reflect complementary approaches. From the designer's perspective, for example, governments tend to deal with major problems by listening to 'scientific' advice, then trading expediencies in a way that maintains the political status quo. Whereas designers are trained to deliver desirable, pragmatic solutions within a short timescale, scientists are trained to regard evidence-based knowledge and reasoning as vital prerequisites to prudent practice. Dr. Brundtland, former Director-General of the World Health Organization famously likened the problem of biodiversity to a major fire: "The Library of Life is burning and we do not even know the titles of the books"[7]. Perhaps it is because I am more of a designer than a scientist I find this to be a peculiar analogy. If I am watching the library burn, my instinct is to put out the flames, not to lament my lack of knowledge. However, a scientist would probably argue that finding sensible remedies cannot work unless we can differentiate between species that look identical, yet are at very different levels of risk. More than three centuries after his birth, Carl Linnaeus (1707-1778) is still highly praised for simplifying the elaborate nomenclature that previous scholars used to differentiate between species. He is also celebrated for his clear taxonomy of classification. Nonetheless, while his efforts may have made it easier to document all life on Earth, the task has proved much too big to accomplish. Recent studies estimate that 86% of all land species and 91% of all sea species are unclassified or undiscovered[8].

4 Can Scientists Work More Closely With Designers?

Much of the problem lies not with science, but with the way that scientific knowledge tends to be managed. In the fishing industry, for example, just as politicians may be tempted to exaggerate figures when setting catch quotas, so fisheries are equally tempted to exceed these quotas. This led to the scandalous process of 'discards', trawled fish that exceed the official quotas[9]. With all due respect to scientists, we cannot wait for 'robust data', evidence-based reasoning, or so-called 'rigorous' analysis of the problem in order to address it. In other words, we cannot expect to name and classify all of the relevant species. Therefore, while we know that a ban on bottom trawlers would probably save some species of marine life, it is difficult to know which ones. On the other hand, it is enough to know that some 'fish fingers' (or 'fish sticks') may contain a proportion of unnamed and/or unknown species. This is closer to design practices, in which designers often have to make formative decisions before there is clear, evidence-based knowledge. Moreover, it would be politically difficult to do so, unless alternative technologies and business models can be offered. This is where design thinking is useful, especially if it can be brought into synergy with the gathering of scientific truths, and the making of political decisions. These hybrid systems of governance would need to embrace what I have called 'auspicious reasoning'[1], which is contingent and outcome-focused, rather than knowledge-based, or truth-focused. A well-known example of 'inauspicious reasoning' is the 'tragedy of the commons'[10], which reminds us that humans often choose actions with selfish and, or, short-term gratification, rather than settling for small, immediate reductions in well-being that will ensure greater long-term safety, or abundance, for all.

5 The Importance of Synergy

Since Darwin, the life sciences have offered a worldview in which living systems (appear to) defy entropy and create emergent forms of abundance. Unfortunately, the dominant paradigms of governance appear to reflect a less optimistic view that emerged from physics, inspired by the exploitative logic of mining. Both traditions depict the world as a materials and energy system that is 'running out', or 'running down'. This unhelpful mindset can also be found in school curricula, and in the non-ecological terms used by most environmentalists (e.g. in the notions of 'resources', 'entropy' and 'sustainability'). There are very few 'resources' that are beneficial when consumed by themselves. Indeed, Peter Corning claims that synergy is the cause behind the evolution of complexity in living systems[11]. Buckminster Fuller was probably the first person to show that, by designing for synergy, rather than for better products or services, designers would achieve more with less. He defines it as "...the behaviour of whole systems unpredicted by the separately observed behaviours of their parts taken separately"[12]. In a simple

example, combining nickel, iron and manganese to makes stainless steel, which is up to 35% stronger than any of its constituents. 'Synergy' also became a key term within our metadesign research. This is partly because it applies equally to systems, whether they are seen as animate, or inanimate. But, despite its invaluable benefits, the task of seeking, harvesting and harnessing synergies may raise complex epistemological, technological, or managerial difficulties. This is probably because it appears in such a diverse and, often, elusive forms. For example, spontaneous humour, or a spiritually uplifting experience, are no less synergistic than the combinatorial benefits of stainless steel. In practice, many are hard to disentangle from the processes with which one thinks, experiences, shares and acts.

Fig.1 Laufrad Campa Vento bicycle wheel

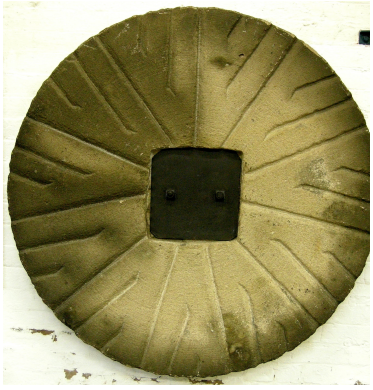

Fig.2 Millstone

6 Creating Synergies-of-Synergies

The bicycle is said to be the most energy-efficient mode of transport on the planet. We can learn a great deal from how its vast array of subtle alignments (i.e. a 'synergy-of-synergies') is configured. As it is easier to analyse some of its simpler synergies, we will use these as a basis from which to reflect on more complex features. Fig.1 shows a modern design whose metallurgical synergies combine with synergies of form. The use of stainless steel (see previous paragraph) for making wheel spokes ensures that they are considerably lighter than a more solid design. This is because stainless steel is far stronger when under tension, than in compression. These, and a totality of other synergies, make it capable of supporting a load that is up to seven hundred times its own weight. As this example may sound like the traditional 'economies-of-scale' logic, how might we

retrieve 'ecologies-of-scale'? Here, we should not forget that, like any ecosystem (or 'paradigm') the bicycle is part of a much larger system that includes, in this case, a suitable cyclist, a transport culture and a network of flat roads.

7 Creating Synergies-of-Synergies

Let us look at a more qualitative mode of synergy. For example, when brought together in the appropriate way, the poisons, chlorine and sodium, become nutritionally useful and palatable in the form of salt. Unfortunately, simple, 'free-standing' synergies are less common than complex, messy ones, because most synergies have more than one property (e.g. most stainless steels last far longer than ordinary steels because they do not rust). Hence, we probably fail to notice new synergies[13] even though they may be abundant and ubiquitous. In many cases they operate outside what can easily be described. This underlines the subjective nature of synergy, and its dependence on our creative ability to imagine conditions beyond the current affordances of ones language. This is similar to the challenge of supporting hitherto unnoticed, unnamed or untaxonomised species. However, it also suggests that we can adapt to the universe in a myriad of unforeseen ways. How might we set about creating spiritual states, or even miracles[14]? The first step is almost an act of faith, because observation is an emotional, as well as a rational faculty. This can begin with the logical assertion that 'unthinkable' things may be attainable, once we begin to notice them. After all, until quite recently, ships made of iron, flying machines, and quantum logic were all 'unthinkable' or 'impossible'.

8 Learning from Synergistic Complexity

For example, by exploring synergies, a good cook can combine ordinary, local, inexpensive cooking ingredients and turn them into an extraordinary experience for her, or his, guests. This example includes very many types of synergy - from the way heat melts cheese, or butter (i.e. simple physics) to the more complex nutritional benefits of combining, say, broccoli and sprouts[15]. The way that people co-create a unique, indefinable atmosphere together is even more complex and intangible. One thing we can learn from food synergies is the way that complementary flavours work. Some molecular gastronomists predict that any two foods with a common (molecular) ingredient will taste good when combined. Also, some apparently incompatible substances, such as oil and water can be made to mix when an emulsifier is added. This works if the emulsifier's molecular chain has a water-compatible atom at one end and an oil-compatible atom at the other. These lessons from food technology can be applied, via metaphors, to other systems. For example, 'immiscible' ingredients, such as oil and water, can be combined when an emulsifier is added. The same principle could be applied

to teams containing antagonistic members. Hence, differences might be resolved ('emulsified') via a third party who seems benign to each of the antagonists. Ecosystems can be used as the model for a new order of innovation. For one reason, their complexity and interdependency that makes them resilient within a community context. We know, for example, that 'keystone species' are critical to the survival of other species, so we might set about designing 'keystone synergies' that would engender, and sustain, subordinate synergies within a given environment or context(see Fig.2). Another way to explain this process is by thinking of it as a singular act that behaves as a 'manifold innovation' that brings many benefits to many stakeholders. A good historical example is the millstone, which attracted many subsequent social, cultural, nutritional and technological synergies.

9 Continuously Re-Languaging Nature

While we might assume, hypothetically speaking, that ecological diversity can be enhanced, it may be hard to see how this can be achieved. This is partly because the 'language' we use to enframe nature is always less than adequate to the situation. Systems theory helped us to recognise the important interdependencies between meanings and actions in ecosystems. However, this relationship embodies a paradox. Although language shapes our 'realities' and guides our actions[16-17], Nature is ineffable and emergent, and will therefore defy clear and enduring definition[18]. Hence, while new ideas may only become popularly understood when suitable terminology is found, this may have a limited era of usefulness. Sometimes, seemingly simple keywords prove too difficult, or unpopular, to be accepted. For example, the rather narrow term 'ecological footprint'[19] soon gave way to the (even narrower) idea of 'carbon footprint'[19], thus giving the false impression that the complex phenomena that cause climate change can be curbed by simple economic transactions that 'offset' carbon emissions, or by geoengineering solutions that aim to 'remove' it from the environment. Arguably, in living systems, the task of creating, modulating and switching meanings cannot be managed successfully in a top-down, external, or hierarchical way, especially when the hierarchy grows and becomes many-layered. This follows from Ross Ashby's Law of Requisite Variety, which warns of the dangers of arbitrarily reducing the number of variables within subsystems[20]. Maturana and Varela offer a useful ecomimetic account of living systems, by explaining that they balance the 'meaning' of their internal and their external identities[21].

10 Re-languaging Sustainability

The above description suggests that the survival of a given species is, at least, explicable within systemic terms that transcend ethics. No organism deserves

longevity because of an a priori moral right or because it enjoys a privileged status. This is because there a seldom a simple, intuitive logic of cause-and-effect, or a fixed hierarchy of relations. Here, it is the ambiguity of the popular term 'sustainable'[22] that has rendered it unhelpful. The verb 'to sustain' denotes a continuation over time, but it may also carry the non-temporal meaning of something 'holding together'. Using the verb 'to sustain' transitively and temporally (e.g. 'B' sustains the continued existence of 'A') would clarify the direction of causation. However, merely saying that something is 'sustainable' does not make clear who 'sustains' what. In any case, reciprocal (2-way) relationships are prevalent in ecosystems, even though this may seem counterintuitive. The death of a predator species, for example, may seem to 'cause' the death of its prey. I therefore use the term 'co-sustainment' instead of 'sustainability', as it acknowledges the mutual dependency of all living systems[23]. Evolution adjusts relationships all the time, which means that everything is always changing. In order for a species to endure - i.e. to remain a viable part of the whole - it must always be ready to adapt to its changing habitat. This means adjusting our actions and identities, rather than trying to re-design Nature in accordance with our expectations. Inviting designers to work at this level would also mean re-designing the design paradigm that is part of the problem.

11 Changing the Change

In practical terms, we have found it helpful to change other key terms that were being applied in what we saw as a dubious, or unhelpful way. For example, we stopped using certain terms (e.g. 'creativity', 'sustainability' and 'biomimicry') and designed more useful alternatives (i.e. 'sympoiesis', 'co-sustainment' and 'ecomimicry'). The idea of 'languaging' change is not only a theory about the seamlessness of interplay between action and thought. It is, also, a practical way for design teams to co-create their 'survival' as whole, living systems. However, this active, radical, consensual reframing of meaning means that, of necessity, the participant's perceived reality will also change (we are aware that this also applies to us, as 'metadesigners'). We have, therefore, found it useful to follow Maturana and Varela's practice of using the word 'language' as a verb. As this change would be both shared and self-reflexive, our new, shared self-identity cannot be separated from our behavioural culture. This pluralisation of identity, led us to coin the term 'sympoiesis'[24], based on the idea of 'autopoiesis'[25], in which living systems 'create themselves'. This is also reminiscent of Freud's early notion of 'polymorphous perversity'[26], which describes how an infant steers its habits and identities by making situated choices based on its personal experience of gratification or displeasure. These habits may later be guided by the values and responses of the society, which are also mediated by the framework of language

within which the infant will, in theory, be free to co-create, as a member of that society. It may also be that there insufficient creative optimism, or opportunism, within the metadesign team. This also has useful implications for the future of democracy. Indeed, the work of Donella Meadows (1997) implies that the collective imagination is more powerful than the counting of individual votes.

12 How Can We Do It Better?

Unless we decide to see our fate as a largely self-inflicted (and well-deserved) inevitability, we need some decisive action that will have the requisite effect on species decline. I have been arguing for many years that design professionals might be a helpful complement to the range of experts currently consulted by the most influential government agencies and corporations. This would mean commissioning designers to be servants of humanity, rather than working for the profit of a few. Unfortunately, most are trained to be specialist mercenaries who apply their 'creative' visual intelligence to service the insatiable demands of a consumer-led economy. While designers have shown themselves to be indispensible to the commercial system, they are less influential for their thinking. Western thought has tended to value logic and truth so many of the major professions are educated within a learning culture that tends to see knowledge as a set of truth-claims, backed-up by evidence. Designers are different because they are trained to immerse themselves in the pleasurable immediacy of forms and images. But they also think in terms of anticipatory affordances (i.e. the optimistically hypothetical, the creatively provisional and the contingently possible). These not only include skills cultivated in schools and universities, but they also reflect a set of capabilities that evolved over the last million years, or so[27]. At the end of the 1960s, the scientist, Herbert Simon and the designer Victor Papanek[28] both made the claim that everyone is a designer. In Simon's version, we 'design' whenever we create a particular course of action that is likely to change an existing situation into a preferred one[29]. More recently, the sociologist, Zigmunt Bauman pushed the idea further by arguing that the similarity between design and management has existed since the late 1880s, when governments invited designers and managers to bring science and technology into everyday life[30]. Recently, Tim Brown[31] has popularised what Herbert Simon[29] called 'design thinking', and what Nigel Cross called 'designerly ways of knowing'[32]. Before this, many non-designers had not fully appreciated the distinctiveness of these approaches.

13 Design for Survival

According to John Thackara (2005) the decisions we take at the design stage are the 'cause' of 80% of the environmental impact of the products. Yet, historically, although designers are encouraged to explore alternative futures in a creative

way, their status, as a 'minor', or relatively junior, profession has given them few opportunities to work at a more strategic level. This may help to explain why we are stuck in a paradigm of bad habits that perpetuates confused thinking. To be able to tackle highly complex problems, such as biodiversity losses, designers would need to rethink their traditional role as catalysts of the consumer society. Rather than working as specialists, they would need to cultivate a more self-reflexive and comprehensive approach that enables them to intervene at many simultaneous points within a whole system. They might need to learn how to create synergies for all, rather than new products and services. The pivotal role of designers within the fashion industry highlights this, in quite an ironic way. In Europe, the habits of the fashion industry cause around 10% of all the waste produced, yet the role assigned to designers makes them seem more like the problem than the solution. This is a systemic problem that cannot be blamed on one particular group or method. As Mathilda Tham, the trends forecaster, put it, 'fashion thrives on innovation but resists change'[33]. In other words, although fashion designers may be capable of re-thinking long-term business futures, they are trained to ignore these possibilities, and to focus onto next season's style-futures. But, if designers were trained to envision long-term business futures, they would be able to deliver waste-free rewards for corporations. The 'cradle-to-cradle' movement is an excellent example of this approach. By creating an adaptive, circular economy, rather than one that looks for unlimited innovation and growth, it will be possible to design complex synergies of combination, rather than offering short-life products that cost additional money for their dispose.

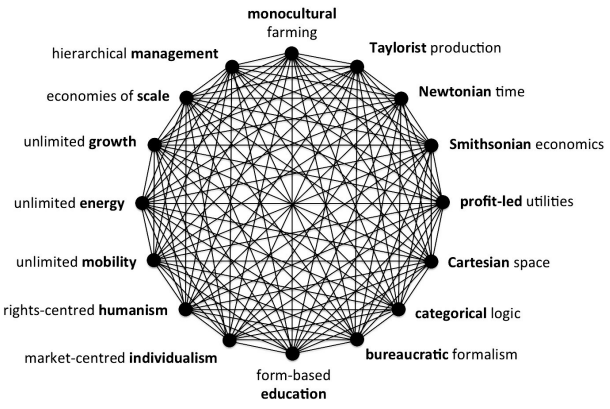

Fig.3 Some of the co-sustaining paradigms that maintain the status quo.

14 Re-Designing Paradigms

What is stopping the implementation of systems that will produce longer-term outcomes? To a great extent, the obstacles to change are caused by the poor economic thinking behind technological development. If designers are not paid to look beyond their short-term cycle of design, production and re-design they cannot take full responsibility for what happens in the longer-term. One way to reconcile design thinking with ecological thinking is to invent a systemic discourse within which complex systems are seen as 'paradigms'[34], because they resemble ecosystems. They also contain both animate, and inanimate agencies, similar to James Lovelock's Gaia theory[35]. And these paradigms sustain themselves by attracting new elements that serve to support them. While designers tend to be taught how to (re)design existing products, we also need more radical solutions at the paradigmatic level. For example, although architects are trained to come up with a variety of iterations to high-rise offices, few are able to re-think the underlying paradigm of concrete, steel and glass, even though these materials have an inordinately large carbon footprint. The high-rise office is ubiquitous to London, New York or Beijing. Like all paradigms, it resists change because it is sustained by an interconnected array of subsidiary systems (also paradigms, or quasi-species), such as insurance protocols, commercial habits, technological habits, economic assumptions - each of which appears to depend on it for their own survival[36].

15 Design for Biodiversity

In order to encourage designers to achieve better levels of 'co-sustainment', we would need to develop a more 'ecomimetic' approach[37]. Ecomimicry is significantly different from what is known as 'biomimicry'[38]. Although 'biomimicry' was defined within an admirably broad philosophy, the way that designers tend to apply it seems disappointingly narrow. Perhaps this reflects the prevailing business mindset, in which projects are seldom seen as part of a circular[39], or long-term economic vision. Even today, it is hard to find examples of biomimetic innovation that do much more than behave as discrete technological 'fixes', gadgets or products. Instead of seeing the designer's role as the fixer of links in a chain of transactions, 'ecomimetic designers' would be expected to design the "conditions" that support interdependencies within whole systems. This is not a simple, or trivial shift. For example, the massive complexity and ineffability of these interdependencies mean that we can no longer expect to work predictively, as we might have done with, say, product design. Many other aspects of design, as we know it, will also need to change, therefore we will refer to the new approach as metadesign. One of the radical changes we need to make is to re-purpose what we understand as 'creativity' and acquire a wiser understanding

of relations, rather than separate 'things'.

16 Re-inventing Creativity

Integrating hitherto disconnected methodologies is useful, but it is not enough. We also need to modify the assumptions that motivate designers, especially where 'creativity' is concerned. This means analysing and, where necessary, challenging the received assumptions behind this term. In the last decade or two, we have seen particular models of creativity as tools for regenerating urban communities [40], for stimulating economic growth, or for transforming businesses to make the economy more 'efficient'[41]. Here, 'creatives', such as designers, have come to be seen as part of a dependable toolbox that can bring success to prestigious real estate deals, national re-branding exercises, or other tourist attractions, such as the hosting of an Olympic Games events. How might we think of 'creativity' if the main aim is to generate wellbeing and prosperity by achieving optimum biodiversity? I believe we must develop creativity's capacity to help us to 'adapt' better to our changing habitat. This may include applying it, less to the defeat of existing, or rival, plans but to look for new 'synergies' that will deliver additional benefits that emerge from combining existing things.

17 The Problem of 'Creative Genius'

One of the problems with the modern idea of 'creativity' is that it became part of the culture of competitive advantage, rather than a way to adapt to new situations. Often, one finds ecological terminology applied, shamelessly, to an economic context whose autonomy is seldom framed within the bigger picture. And it is increasingly associated with destructive terms, such as 'disruptive innovation', or 'disruptive technologies'. These tendencies remind one of the aggressive, pitiless language of Francis Bacon, whose crude scientific methodologies are perpetuated in some global corporations, whose products continue to threaten the survival of certain key species. The same, swaggering, solipsistic stance can also be noted from books on creativity and innovation, such as 'Ignore Everybody' or 'Relentless Innovation'. Redefining creativity is not a simple step. The destructive and egoistic models that we inherited from the Romantics remain part of the popular culture. After the Enlightenment it came to valorize individual power, originality, and - to be blunt - arrogance. David Hume (1711-1776) and others, such as Arthur Schopenhauer (1788-1860), strongly admired the notion of 'genius' as someone who is so extraordinarily self-styled and unfathomable that he would struggle to adapt to the 'normal' world around him. This also echoes Nietzsche's idea of 'Der Übermensch', which developed in the 1880's. This theory asserted that Homo Sapiens has the potential to create a New Order, provided there is a sufficient will to power, and a readiness to reject societal ideals and moral codes.

In the 20th century, inspired by psychoanalysis and by concepts such as 'positive self-regard', 'presentation of self', and 'self-actualisation' creativity came to be associated with the right to personal self-expression.

18 Unreasonable Men

In a sense, then, the modern sense of the word 'creativity' may mean a cynical, or arrogant refusal to adapt to anything. Perhaps this is what the architect, Frank Gehry, meant when he said, in 2005, "I don't do context". Today, the invitation to 'be unreasonable', or to 'think different' (presumably, a fusion of 'be different' and 'think differently') has become familiar to today's consumers. Indeed, the Apple corporation have used it many times to advertise their computers. However, sustaining and enhancing biodiversity will require us to reflect more deeply on the shareable and distributed nature of creativity and how can help us adapt to our habitat. Our stridently humanistic idea of creative may be traced back several thousand years to Horace, who inspired Kant's famous phrase 'dare to know' (1784). And, while it had encouraged a long development of careful reason and inquiry, this was not what we would understand as 'creativity', as we understand it today. By the 17th century the idea of 'daring to know' had inspired John Locke's radical insight (1689) that "the mind can furnish the understanding with ideas". While the notion of 'creative thinking' may now be commonplace for agnostics in the 21st century, it had remained virtually unthinkable to philosophers before Hume and Locke. The idea that an individual can choose to think what s/he wants to, later acquired a powerful framework of thinking, with Coleridge's term 'self-consciousness', as celebrated by a series of narcissistic 'genius' figures who dominated the post-romantic era in art, literature and music.

19 Can We Find Creativity in Nature?

In 1877, ten years before the first Sherlock Holmes publications made it popular, Charles Peirce announced his idea of 'abductive reasoning'. This turned deductive argumentation on its head, by enabling thinkers to begin the process with what might, hitherto, have seemed like a conclusion. While we may see this type of logic as a characteristically human, or even modern, mode of thought, Gregory Bateson has suggested that abductive reasoning is part the natural order: "all thought would be totally impossible in a universe in which abduction was not expectable....."[42]. He believed that evolution is responsible for the parallels between the way we think, and the way Nature works. Arthur Koestler's 'bisociation' method is interesting in this respect, as it is designed to elicit a new idea when two things are combined[43]. This resembles sexual reproduction in that different 'parent' ideas are brought together to create a new hybrid outcome. When the two ideas (or creatures) creatures, 'A' and 'B', are combined - we may

find that we also have a third idea - 'C'. Abductive reasoning is a way to 'reverse engineer' evolutionary logic. Instead of taking the 2 parents and seeing what type of child we will get, we start with the child ('C') and look for an 'A' and a 'B' that might have been its parents. One lesson we can learn from evolution is that creativity is only important when it works to produce new opportunities. And one reason why the Romantic era created so much interest and excitement is because it was less concerned with the strict languages of scientific 'truth' and more to do with enriching the semantic discourse that may, subsequently, become applicable to science. However, unlike scientific 'truths', artistic propositions are usually hard to fathom, without reflecting upon their aesthetic status.

20 The Role of Aesthetics

It will be important to harness aesthetic criteria when changing the paradigm, because aesthetics acts as an interface between thoughts and actions. Aesthetic discourse can change consensus because we share and modify our perceptions when we discuss personal tastes. Arguably, beauty tells us what is good, or, rather, what used to be good. Aesthetics is not only a philosophical discourse, it is also a multi-dimensional field of awareness, so it cannot be quantified using a small number of dimensions. Claims to beauty exist as combinations of elements, or as patterns of sensory awareness, that are deemed to work together. The fact that we have fads in food tastes, or fashions in clothing, is evidence that aesthetic judgements are seldom fixed by a rigid biological 'need', or aesthetic code. However, it seems likely that certain predilections and habits are strongly 'wired' into the human body, especially when they remind it of tastes, flavours, or colours that have proved beneficial to us over many hundreds, or thousands, of years. This is useful to designers (and to artists), because creating new tastes and aesthetic forms will change appetites & habits. A good example of this is the pleasure that we take when they see varieties of the Rosaceae (rose) plant family. Humans have enjoyed products of the rose family for many thousands of years. They have give us many varieties of nutritious fruits, such as apples, apricots, plums, cherries, peaches, pears, raspberries, and strawberries. During this time we have made them bigger and sweeter, thus creating a strong level of co-sustainment between people and the plants themselves. In my opinion it is not a meaningless coincidence that the largest and most successful brand in the world is an 'Apple'.

21 Re-languaging New Realities

In previous papers I have argued that designers have, traditionally, overlooked the importance of language in 'design thinking'. This is not meant to imply that designers should try to think in a more 'critical' way, but that they could be more

creative with the terms that we use to describe things, experiences, values and ideas. How many colours are there in a rainbow? Even though science tells us that it contains countless wavelengths of light, most people answer with a small number (usually 7) they learned at school. But how does this answer affect our perceptions? Our reality is lived out in metaphors, adjectives, images and categories. These, in turn, shape our beliefs, actions and assumptions. If one language has more words for flavours, and for colours, than another, it seems likely that the speaker of this language will have a bigger horizon of experience. The pioneer eco-semiotician, Jakob von Uexküll (1864-1944), used the term 'Umwelt' to describe the phenomenological 'reality' of different creatures. This is an important idea, because no two creatures experience the world in quite the same way. Even though symbiotic relationships may develop within the affordances of an existing language system (i.e. what Maturana & Varela call 'structural coupling') there may be a very tenuous overlap between the two sides of the 'conversation' For example, one may be able to see but not to hear, the other may have the opposite capabilities. This suggests that, by augmenting the naming system we have, we can expand our Umwelt, perhaps in order to re-map vested interests, empathetically, in conjunction with other species. Hypothetically speaking, redefining the agreed purpose of a paradigm should make it easy to change[5]. However, social inertial is co-sustained by the language and customs of the old paradigm, and these tend to mask opportunities, making them seem difficult, unthinkable or impossible. Crudely speaking, the answer is to create new words that would afford new concepts and, perhaps, serve to facilitate new ecological paradigms that enable the Homo Sapiens to survive a little longer.

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Corresponding Author
John Wood can be contacted at: maxripple@gmail.com