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Adaptive Assembly

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Abstract

'Adaptive Assembly' is the name I have given to an integrative tool that I designed to harmonize participatory practices, creatively. This is needed because gaps in mutual understandings commonly emerge where collaborative teams include members from different disciplinary backgrounds and/or cognitive styles. Adaptive Assembly is a new approach to closing the gap between dispersed information and a task's participants. Here, co-authorship is also a cooperative act; therefore writing can be understood within the same terms of reference as design practice. For writers, Adaptive Assembly situates information in an ecological context by which to enable inter-relationships, and from which, newly dynamic information can emerge (e.g., subjects and hidden contexts). The benefit of this ecological method draws participants such as co-authors together to enable a focus and maps out paths towards its realization (e.g., chapters and their categories), each to be envisaged and implemented, incrementally.

Keywords

Benefit, design, ecology, ecosystems, evolution, *the memetic*

In seeking to develop a fresh approach and enable a new, common language for ecological, and ecologies of, practice, and to design creative responses to often-complex challenges, I explored evolutionary theories in some depth and detail (i.e., in my postgraduate studies on my MA Design Futures programme at Goldsmiths, University of London and then, as a basis of my PhD studies). I chose this approach because creative practitioners in art or design can learn much from how evolution 'works', both in broad-brush strokes and in the fine and intricate detail. All that differs is the scale of reference. Whilst my work has been evaluated largely within the practical context of a particular curatorial project in a museum, it is intended as a generic tool that could be used within other creative practices such as writing. However, designing it was not a simple process. The study of evolution is often controversial because processes of 'Natural Selection' (Darwin 1859) sometimes lead to historical misunderstandings that may, for example, be inspired by popular

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myth, misconception or specific lack of understanding. As Darwin wrote, 'Great is the power of steady misrepresentation' (1876). Equally importantly, the design process is by no means congruent with what many non-experts believe to be the processes of evolution, or, in particular, its mechanism, Natural Selection. However, as a designer I am particularly interested in its cultural momentum. This is what, I believe, draws us closer to reliable and real parallels with an organic description of change.

Perhaps the earliest, best-known, but most misunderstood theory derives from Jean Baptiste Lamarck (1801). Long before Darwin he explored interaction and change among plants and animals, and is popularly known, although in the light of recent research somewhat erroneously derided for, his ideas about *The Inheritance of Acquired Characteristics* (1801). This is an early idea that explores how an organism can pass on advantageous characteristics that it has acquired in its own lifetime, and it famously implies a form of teleology. In organic terms, until recently this was thought to be fundamentally wrong. However, artefactual information is what makes our culture possible, via books, songs, and beneficial ways of doing things. Therefore, by integrating a Lamarckian-like framework (in a modern context that uses Darwinism as its root) we may have a viable hypothesis. For example, using my model of Adaptive Assembly, designers can select aspects and characteristics of information, incrementally, and can manipulate these using (subjective) definitions of benefit as a datum. By narrowing their range of outcomes to a given task, iterated over 'generations' of ideas (of the same task) we can filter these down to a core set, of key aspects. This is a Lamarckian-like (i.e., interventionist) mode of selectionism, but because of the fundamental nature of the complexity of interaction, the future, and thus the specific outcome, cannot be defined at the outset. Indeed, the outcome will invariably vary, each time the same procedure is carried out. Therefore, one is left with a practicable, designerly model (for creating benign, *ecological* change), but one that is vitally and specifically rooted within a Darwinian domain. In contrast to Lamarck, Darwin, nearly sixty years later, unravelled the fundamental mechanism for change; this he called Natural Selection, and adopted some of Lamarck's ideas of inheritance after his first edition (1859). His account should not be confused with Spencer's popular representation of evolutionary change as 'The Survival of the Fittest' (1851). This is misleading, yet interesting in itself, as it reveals a lineage of immediate cultural assumptions, riding piggyback – one on the other. For example, Tennyson's famous description of nature is said to have inspired some capitalists:

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Who trusted God was love indeed
And love Creation's final law
Tho' Nature, red in tooth and claw
With ravine, shriek'd against his creed

(*In Memoriam*. A. H. H., 1850)

Darwinism is non-deterministic, therefore, specific outcomes – however they are manifest or defined – are unpredictable.

The *idea-of* (my neologism, devised from Plato's notion of the inheritable *form*, of something) has proved more exciting than the putative practice of explicitly attempting to use 'memes' or its study, memetics. The attractiveness of memes has proved particularly exciting to designers, and advertising practices because they (memes) *appear* to resemble successful designs that have become replicated and dispersed rapidly and widely. This resemblance emerges because we make perceptions of their fitness, or benefit to fit perceptions of our (subjective) 'purposes'. When we use evolutionary theory to look backwards, as a simple, retrospective form of analysis, it is tempting, for example, to see the MP3 player as a kind of memetic entity that simultaneously integrates 'fitness' (i.e., benefit) at a number of levels that would be familiar to a marketing expert. The idea of a meme as a kind of natural, self-replicating pattern, or code is usually attributed to Dawkins (1976; 1997: p.1-17), although many subsequent authors (e.g. Lynch 1996; Gabora 1997; Blackmore 1999; Aunger 2000; Brodie 2004) have adopted his overall model for their own purposes. Indeed, it is closer to the lesser known, but equally powerful idea, devised by Semon (1901, in Schacter 2001) a zoologist and evolutionary biologist. His term, 'mneme', conceptualizes the memory of 'external-to-internal experience' and is derived from the Greek goddess Mnemosyne – one of the muses of memory (after Bulfinch 1980). Semon implicitly understood the wider, cultural values implied by Lamarck's *Inheritance of Acquired Characteristics* (1801) and thus allies to my thesis for design (e.g., enabling [some] human agency within the unpredictability of interactions) by combining Lamarckism and Memetics via their roots within Darwinism.

Using ideas of specific selection of characteristics and other information about an entity are very enticing, particularly to designers. However, attempts to 'design a meme' have nevertheless proved more difficult than expected, although some (e.g. Langrish 2004) have developed additional concepts, such as 'Selectemes' and

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'Recipemes' in creating a total of three different forms of meme idea that he (Langrish) devised in an attempt to reflect the basis of Natural Selection (i.e., Selection, Variation and Transmission). I believe however that memes cannot be specifically designed – for a specific purpose. I have come to this conclusion because of the fundamental nature of, and the complexity created by, interactions: between 'observer and artefact'. However, devices such as 'Selectemes' and so forth may indeed be necessary in order to give the designer more control than would normally be evident within an evolving system (c.f. Salingaros and Mikiten 2002; Gabora 2004; Distin 2005; Whyte 2007).

Using the first case study in my research, I initially explored the parallels between the success of given designs. In this, I sought to show that it is possible to analyse the features of a set of designs (e.g., paper clips and Bronze Age axes) and to draw closer, common values or design features between them. In effect, this shows that dispersed artefacts may have common affordances (i.e., a common language for interaction) in their practical use. These features can then be extracted, and the *idea-of* them (e.g., grippability, relative size etc.) employed in other, new design concepts. The commonality of group traits is recognizable in the success of a particular species, or type of organism, in as much as a species reflects a traceable lineage of comparable information derived from its lineage of ancestors (the definition of successful information, organic or other). Using the idea of *the memetic* in the design world (when represented as a 'pattern', e.g., Langrish 2004, rather than a 'unit' e.g., Blackmore 1999) one is able to see a similar opportunistic co-influence and hybridization of 'rival' or proximate artefacts. In the natural world, there is a similar process of coevolution (and culturally) selective breeding (e.g., Darwin 1868; Beja-Pereira et al. 2003; Richardson et al. 2005). Hence, it is common practice to speak of the 'evolution' of technology as a metaphor (e.g., Pitt Rivers 1827–1900; Shennan 2002) for what we might otherwise attribute to individual designers, or as 'design innovation' (e.g., Ziman et al. 2003). Conversely, it is often said that animals, insects, and many other organisms are 'perfectly designed'. This is wrong: in fact, they are *designoid* (e.g., Dawkins 2004: 497), as they are merely the latest product of evolving, interlinked information that is feeding back ecological information (i.e., between the entity and its proximate environmental stimuli).

Taking this on board, one is able to then include the incremental assembly of more complex design strategies within an approach to 'Metadesign' (Giaccardi et al.

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2005), which in turn reflects in the original concepts and ideas about 'affordances' (e.g., Gibson et al. (1977). Devised by the perceptual psychologist, J. J. Gibson and advanced by Donald Norman (e.g., 1988, 2002: 9-12; Gaver 1991, 1992, 1996), an affordance is information about action regarded as being available in the environment (Greeno, 1994). 'The word "affordance" was originally invented to refer to the actionable properties between the world and an actor (a person or animal)' (Norman, 2007). Affordances invite forms of action, perceptual or actual.

Evolutionary theory inspired these key concepts, such as Bertrand Russell's notion of 'Sense-data' (1912) that has become almost indispensable to designers of computer-user interfaces (Gibson 1977, 1979; Greeno 1994; Gaver 1996; Norman 1988, 2002). Affordances enable designers to envisage the 'design', or facilitation of reciprocal relations between complex tools and their users. Human awareness of the scale of interconnectedness of evolving organisms inspired the development of General Systems Theory (Bertalanffy, 1971) and Cybernetics (e.g., Ashby 1958, in Heylighen 1992). They too sought their own common language by which to describe apparently incommensurate worlds, such as machines and living creatures. Action Research (e.g., Flood, in Reason et al. 2006) represents another framework that includes *all* participants – but importantly, this specifically takes place in practice (e.g., the researcher, author,) – as equal participants in the same process that are also being interacted with by others.

As I needed to develop my own working principles, I was inspired by Bates (1861) who used the term 'analogical resemblance' in defining environmental 'mimicry' (Gould 2002: 67). This idea led me to devise a new idea of affordances, in which I see them as 'modules' of environmentally rooted, informational stimuli. These include perceptions etc., and other *ideas-of* proximate relatedness that is interpreted by the individual – in that system. Hence, it is helpful to see the 'mimetic' (not to be confused with *the memetic*) as this *'idea-of'* something, rather than a specific example of it. This helps to show how designers seldom copy another designer's work faithfully, choosing, rather to take the *idea-of* – or, features of - 'it'. Although this sounds simple, it raises questions about what, exactly, 'it' is that is similar, and what is different?

Some of the terms deriving from evolutionary theories, such as 'best-fit', and 'costs over benefits', derive from studies of survival economies (e.g., Dawkins 2004;

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Henrich, Boyd and Richardson 2002), which may now be more reminiscent of organization, or management methods.

'Best-fit', like 'costs-over-benefits', describes a balance that emerges as a product of 'trade-offs' (Boyd and Richardson 2005; Cuddington and Hastings 2004) between the two interconnected aspects of an entity's survival. Further, such economy is characteristic of the 'fitness potential' (Madsen et al. 1999; Gabora 2000) in an ecosystem, or indeed, in the combination of (multiple) individuals' ecosystems. If mutual benefits are first to be gained and subsequently maintained, aspects, which constitute the relative information values at hand (e.g., the 'cost' – of a particular action) must be individually traded off (i.e., ecologically balanced) against other information (e.g., the 'benefit' – of this particular action). This natural economic process is constantly at work. For example, in a given ecosystem, the ability to *adapt* to changes that, in turn, offer the least cost – in relation to the greatest benefit – confers (automatically), a survival *advantage*, although not a specific or necessarily advantageous outcome (to the owner of that ability).

This enabled me to reconcile those aspects of affordances that are *designable*, with those that are *memetic.* This distinction is similar to that of a *designoid*'s emergent, evolving characteristic, which merely resembles something that was designed. This can be shown in the cultural selection and widespread dispersal of VHS video over the superior quality of Betamax in the 1980s. The widespread influence and commercial superiority of VHS is its *memetic* or pattern. This is a cultural trace that has been left in the social system by all the artefacts that are denoted as being of VHS type, and is reinforced by peripheral objects that serve to maintain this cultural identity. In my view, this pattern could not have been designed because it slowly emerged as a product of complex interactions that rendered its eventual outcomes largely unpredictable. I derived aspects of this idea in combining an understanding of natural interactions that also includes rhizomes (Deleuze et al. 2004: 1-28) and 'enfoldment' and 'unfoldment' (Bohm and Peat 2000: 178). This is an evocative idea that encompasses the notion of an organic flux between external and internal characteristics. This concept is important within an evolutionary framework.

I have considered all of the above methods, and more, in my development of a new mode of design practice. This was given its first trial in the management of a curating task within a county museum (Warwickshire Museum). In a curatorial situation, events resemble aspects of the VHS case. For example, they are

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governed by a plethora of seemingly disconnected elements that include workshop tools and materials, space and funding, not to mention the many different personalities, ideologies, politics, aesthetic judgements and professional preferences in methodology.

While some of the above approaches may inform, or illuminate the issues surrounding such complex circumstances, they did not readily provide the sufficiently integrative, or 'hands-on' approach that was needed. I therefore considered the notion of *the memetic*, to attempt to challenge the accepted, but somewhat limited (and commonly misunderstood), concept of genetic, and particularly viral analogies to the meme (e.g., as that found in viral marketing). My own idea of *the memetic* is designed to suggest flow, momentum and 'patterns' as networks of information. This moves my ideas away from epidemiological inferences, in which memes are represented as 'units' (e.g., Dawkins 1976) of contagion, or as a 'mind virus' (Brodie 1996). Instead, I sought benign, ecological contexts for enabling and maintaining change. *The memetic*, instead, derives from the fundamentally open-ended nature of interactions and their products; this applies equally to both organic and, indeed, inorganic (cultural/artificial/designed) paradigms where human agency is present. I suggest that this is because each are reflective of one another (in terms of informational exchange and its dynamics) and are two sides of the same coin.

My approach to structuring information as a creative process is based on the way that information evolves, by adopting some aspects, and by rejecting others. Until quite recently, one of the key issues in evolutionary theory was the received (i.e., Darwinian) idea that change (e.g., genetic mutation) within a given species could only take place via reproduction, striving for any and various means of survival. However, relatively recently it has been found that genes change (they can be switched 'on' and 'off') during the lifetime of a given organism (e.g., as a result of trauma resulting from a given experience). Epigenetic Inheritance describes this heritability of these and many other environmental characteristics (Waddington 1956; Jablonka et al. 2004). This makes the notion of evolution more similar to what we could recognize as design (i.e., bias in selection; reminiscent of Lamarck's historically misconstrued idea of *The Inheritance of Acquired Characteristics*, 1801). However, importantly, the outcomes genotypically and, indeed, phenotypically manifested, remain fundamentally non-determinate, and in the natural (i.e., organic) habitat on Earth, this remains devoid of any specific design.

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In ecological systems, the survival of a whole cluster of species is often found to depend on the continued existence of one species, a 'keystone species' (Stinchcombe and Schmitt 2006). In setting up an ecological study I incorporated an interpretation of keystone species within my model and its trial. (i.e., *The memetic* has as a nucleus a keystone characteristic: e.g., a form of intervention – represented in the system as a benefit - this can be described as an intervention-interaction coalescence.)

Studying the feeding behaviour of garden birds, designated within a specific area, or patch, I tested my idea by making ecologically derived, modular interventions, and was then able to identify from the collated data two categories for adaptational lag periods. These represent Primary Adaptive Lag (PAL), the period after an intervention is made, up to the time when adaptations occur. The second phase represents Elapsing Adaptive Lag (EAL). This is a period where adaptations to an intervention can be seen to be falling off and where new or iterative intervention modules can be made. New adaptations to those then emerge, and the cycle begins once again at PAL. However, immediate responses, beneficial or otherwise (and their outcomes), cannot be expected directly after an intervention is made into any ecosystem, whether they are organic, or inorganic. Therefore, interventions should be made before, as opposed to when, change is required. By identifying lag periods between interventions and their outcomes helped me to understand and structure further intervention periods because they each represent the variable rates of adaptation to an intervention made into an ecologically defined system.
My approach, therefore, is an adaptation of several evolutionary theories to enable an ecological synthesis, by which to structure some (human) agency within fundamentally unpredictable, cultural interactions. Through an incremental approach, individual actions become recognizable as components of the ecological, mutual act (*e.g., it treats individuals as members of social groups*). Writing practice can therefore be regarded as a designerly process of enabling such interaction economies (e.g., by recognizing the interplay as evidence of a kind of ecological necessity that exists between, or across, subject layers and those within others). If these interactions become (subjectively) incrementally beneficial, they can enable and nurture the emergence of *the memetic* as a layered dynamic, or flow of 'beneficial' (Perkins, in Ziman 2003: 161) information about interactions and their connectivities, for example within the task of structuring the complexes found in a writing process.

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I plan to explore this approach as a novel way to inform writing as a group practice. This offers ways in which to structure diverse or complex issues. For example, constructing a map of subject proximities enables an ecological range of connectivities to emerge that reconcile the author's subject areas, and core values. It also offers a new way in which authors might be able to situate a given text within a specific context. Using the idea of incremental change enabled by the reiteration of key ideas is helpful in structuring chapter position and order (i.e., the relationship of specific inclusions). A similar process can be used to create headings, subheadings and how these inter-relate. I expect this approach to be particularly helpful when a range of contributors is included within the process. If each is able to benefit from the group dynamics (e.g., by using subjective interpretation to gain advantage) then these benefits can emerge to coalesce within the group. The *group* benefit – *the memetic* – enables a closer relationship to be maintained and, therefore, the ecology of that group, and approaches to its aim, and the cultural value of the outcomes, benefit as a whole.

Via individual perceptions, *ideas-of* and actual benefits, emerge mutual interpretations of this coalescence. Incrementally reducing the search-space of a writing task, through identifying forms of individual benefit – subjectively defined – enables an ecological process – as a practice. By this method, layers of information that comprise the task aim (e.g., chapters, content within those, or the text as a whole document) and interactions with them – and *their* participants – can be economically interconnected to each.

From these early explorations, I am able to envisage other areas where this approach can be of benefit. Recursive re-assessments of the content enables all parties to openly question their understandings of it and, because of this dynamic, it becomes an anticipated (although not deterministic) characteristic of the process (e.g., a prospecting tool); this enables the work of writing and its act (i.e., creativity) to become mutually joined. Individually contributing to a common aim, incrementally combining, selecting and, indeed, rejecting an array of elements, becomes an explicit approach to combining and structuring 'environmental information' and one that is made *in* practice. It proved useful as an approach to reducing problem-spaces within normal curatorial practices (Spring, 2008). Drawing dispersed participants closer (e.g., through an approach to openly interpreting the object at hand, such as artefacts, writing subjects and, interactions with them) can enliven group action and add participatory values to the process. For example, in

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an approach to Furniture Design, or Interior Design practices it would be similarly used to assemble a co-design relationship between designer and client.

In writing and its planning and structure, as an approach to enquiry and its feedback, it can also be applicable to contributing a form of ecological, 'experiential' learning (e.g., after Dewey 1933, in Reason et al. 2006). For example, methods used in my thesis and its first model are to be included in 'Distance Learning': Theory and Practice, the MA in Museum Studies, a programme within the Department of Museum Studies, University of Leicester Exhibition.

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Before successfully completing an MA (Design Futures) and then, a PhD in Design at Goldsmiths, University of London in early 2008 peter began his career first studying Fine Art at Adelaide School of Art, South Australia, in 1986. Returning to the UK in 1998 he studied for a BA(Hons) in Furniture and Product Design at Kingston University, UK. After six years as an Art Director for a Children's television company, in 1996 he formed his own bespoke furniture design company. In 2000, leaving London and while continuing to design high quality pieces for private clients, he became interested in exploring design as a learning tool. Now living in Henley on Thames with his partner, Catherine, Peter specialises in Museum and Heritage Exhibition Design and is also a freelance interaction and design consultant.

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