

RETHINKING DESIGN HISTORY FROM AN EVOLUTIONARY PERSPECTIVE

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This paper argues for the significance of a Darwinian evolutionary perspective for design history. From such a perspective, artifacts are viewed as manifestations of ideas which are replicated and propagated, in other words as memes. Good designs are not ideal forms, but fitting forms which have evolved through adaptation processes within particular social, economic, and technological contexts. I argue that such an evolutionary understanding would suggest rewriting design history, in order to accommodate a wider conception of the nature and role of artifacts. The potential implications for design education and design praxis might be groundbreaking. They are illustrated by discussing the anti-star approach and the Open Source model.

"[...] a thousand thousand thousand and one different currents, each one of a different colour, weaving in and out of one another like a liquid tapestry of breathtaking complexity; [...] these were the Streams of Story, [...] each coloured strand represented and contained a single tale. Different parts of the Ocean contained different sorts of stories, and as all the stories that had ever been told and many that were still in the process of being invented could be found here, the Ocean of the Streams of Story was in fact the biggest library in the universe. And because the stories were held in fluid form, they retained the ability to change, to become new versions of themselves, to join up with other stories and so become yet another stories..."

Salman Rushdie, *Haroun and the Sea of Stories*

INTRODUCTION

Oscar Wilde observed in 1891 that the one duty we owe to history is to rewrite it (Wilde, 1997). This paper argues that rewriting design history under a new perspective based on Darwinian evolutionary theories might indeed be an appropriate path for design historians in the near future. Such a perspective has become more mature, as our idea of design is changing over time. The discipline of design does not remain stable and fixed and, at the same time, our conception and understanding of design also alter. Influential critiques of the history of industrially designed objects are already more than fifteen years old (Dilnot, 1989) (Walker, 1989). Nowadays, it has become almost a commonplace to say that design is no longer limited to the production of material products, but has become expanded to include theories, policies, social programs, opinions, organisational systems, and many others (Jones, 1992) (Buchanan, 1995). Several authors have already pointed out the relevance of evolutionary theories to designed artifacts (Kubler, 1962) (Steadman, 1979) (Pye, 1978) (Basalla, 1988) (Dawkins, 1989) (Langrish, 1999) (Michl, 2002) (Langrish, 2004) (Jonas, 2004). Their views will form the backbone of the main argument put forward here, which is the importance of a Darwinian evolutionary perspective to design history. The potential

implications of such a perspective for design education and practice will also be discussed.

SHEDDING LIGHT ON THE PAST

Numerous theories have been applied over the course of time to explain the processes of change in human artifacts and establish related historical accounts. The starting point of the present paper is the fact that dominant historical narratives of design have relied heavily on linear and progressive approaches. The modernist tradition in particular has created a series of misunderstandings which encompass two aspects: the functional and the stylistic. As far as the functional aspect is concerned, perfection in modernism could be reached through a predictable path. This view was best expressed by Louis Sullivan's famous quotation that 'form follows function'. Michl has demonstrated with clarity and rigour that this is definitely not the case. He has stressed in particular the fact that, although Sullivan conceived of his slogan as an all-pervasive natural law, in fact his view is totally incompatible with the Darwinian explanations of functional adaptations in nature, as we accept them to be true today. The Darwinian theory of natural selection is not teleological and it does entirely without postulating an intending, designing agent; it is therefore an argument against the Sullivan formula (Michl, 1995). On the other hand, the stylistic or formalist aspect of modernism defined aesthetic quality, which was following certain aesthetic ideals considered to be unquestionable and inescapably leading to 'good' design. As Michl has shown, the modernist movement, despite its functional credentials, was in fact driven by highly formalist objectives. These objectives were resulting from the designer's own aesthetic preferences, albeit disguised as the alleged plans of such non-human entities as Nature or History; were therefore considered as inevitable and sacred. Aynsley criticises related views that followed a neo-Kantian search for absolutes and thus led to a perception of design as having general or universal properties. Similarly, misunderstanding of Darwinian evolutionary theories shaped the argument that useful objects evolved towards an optimum form. Le Corbusier's 'type objects' acquired a canonical status and underpinned the notion of timeless classics of design, devoid of any contextual or culturally-produced meaning (Aynsley, 1993).

As recent research has shown, sometimes the quest for idealised product forms went side by side with eugenics, the pseudoscientific thought that the best human traits could and should be cultivated through selective breeding. Such beliefs served as the primary ideological and historical context for the development of theories of streamlining by designers: streamline design aimed at creating an all-encompassing, utopian 'ideal type' (Cogdell, 2003). Both eugenics and streamlining were in fact founded on the evolutionary theories of Herbert Spencer, not those of Darwin. It was Spencer who used the term 'survival of the fittest' and it was his ideas that led to eugenics and other sources of confusion such as the notion of progress towards 'perfection' (Langrish, 2004). The ideal of formal perfectibility is incompatible with a Darwinian evolutionary perspective, because evolution brings about change and adaptation, but it does not necessarily lead to progress, and it never leads to perfection (Mayr, 1991). Misinterpretations of this fundamental tenet of evolution have dominated design discourse and education for several decades and have created a framework which neither stands the test of time, nor satisfies the complex needs of the present.

Dawkins claims that the humanities in general are still taught almost as if Darwin had never lived (Dawkins, 1989). It should of course be admitted that, in recent years, design history has been enriched by various methodologies and has significantly widened its approaches (Margolin, 2002). However,

positive historiographic developments have not become widely accepted in educational institutions in many countries. Similarly, they have not infiltrated the wider public awareness of design. In public perception, design is typically regarded as the pursuit of pretty forms by talented individuals. Design tends to degenerate into aestheticism dealing with the most superficial issues of form and style (Dilnot, 1989). Furthermore, the static concept of style is widely exploited for commercial purposes, in other words for promoting and selling products as cultural icons.

ON THE ORIGIN OF DESIGN IDEAS

The commercial exploitation of products as icons has been largely grounded on the modernist credos, from which follows a conception of design activity as ingenious invention by gifted individuals. Kubler is opposed to such an oversimplification and argues that 'all things and acts and symbols – or the whole of human experience - consist of replicas, gradually changing by minute alterations more than by abrupt leaps of invention' (Kubler, 1962). Pye also makes a very clear statement on the role of evolution in design: 'The best designs have always resulted from an evolutionary process, by making successive slight modifications over a long period of time, not through a feverish insistence on making frequent obvious changes for the sake of offering something which looks "really new and different"' (Pye, 1978). The concept of innovation is therefore less crucial to design activity than generally thought. Design may be regarded as a gradual, step-by-step process of adaptation of formerly existing solutions; it is more often modification than innovation (Van Nierop, Blankendaal and Overbeeke, 1997). In fact, as studies of technological innovation in industry have shown, most organizations are more concerned with minor changes to existing products than with spectacular new concepts. More often than not, success comes from creative imitation by groups where several minds influence each other, rather than from acts by individual genius (Langrish, 1994). However, this process should be clearly distinguished from simply copying, which is mistakenly described as 'the engine of civilization' (Owen, 2004). Producing identical copies does not suffice to generate the diversification and variety which is necessary for selection to be applied.

When the word 'design' is used to express a sole designer's creative activity leading to an ultimate solution, it is in fact holding back the entire cooperative and past-related dimension of designing. Design always contains a collective and cumulative element (Michl, 2002). Continuity is central to product generation, a fact which would allow us to reevaluate artificial divisions between craft and industrial design. It would also enable us to reconsider design achievements that lie outside the conventional, commercial, male-dominated professional model of design activity. This broadened conception of the design domain would encompass, among others, feminist critiques of design history (Attfield, 1989) and the do-it-yourself phenomenon, which operates within as well as challenges the boundaries of craft and design (Atkinson, 2004). This might eventually lead to reclaiming a history of artifacts and environments before industrialisation or outside mainstream industrial processes (Myerson, 1988). In his study of American consumer society between 1870 and 1930, Scranton emphasises the 'complexity of networks of design, technology, labor processes, and distribution involved in historical mutations of manufacturing.' He then warns about excessive simplifications of historical discourse and urges towards the integration of diversity (Scranton, 1994) (Scranton, 1999). The language he uses has obvious biological connotations and suggests an evolutionary treatment of the manufactured world. This may be further linked to the views of Krippendorff, who has defined design as 'making sense of things' rather than 'making

things'. He considers this as a paradigm shift, compared to the old paradigm where designers are authorities on how things should look and be used. In the new paradigm, designers cooperate with users in intervening into individual practices of living (Krippendorff, 1990). This view is compatible with the evolutionary perspective and challenges the authority of the individual designer. As Katz observes, 'making sense' deliberately cultivates historical continuities (Katz, 1997).

Evolutionary interpretations have been taken over by several scholars studying the ways in which industrial products change over time, and extensive case-studies have been developed along these lines. In one of such studies, the evolution of the bicycle is examined on the basis of dynamic systems theory. The authors of this study have shown that the bicycle has diverged and converged in a non-linear way, which is a general characteristic of co-evolving adaptive systems (Van Nierop, Blankendaal and Overbeeke, 1997). In another case-study, the early development of the steam engine is analysed as a search process in a multidimensional design space, by employing recent findings of complex systems theory. The authors interpret the patterns of variety and differentiation of steam engine designs as emerging properties of underlying search processes unfolding in the design space. This means that the early development of steam power technology can be understood as a process of 'technological speciation' of various engine designs in distinct users' niches. Their conclusions constitute a clear refutation of abrupt leaps of creativity and invention: '[...] Rather than a "linear" process of introduction of novel features and replacement of old designs, the early development of the steam engine seems to have been characterized by the formation of a variety of design families, each of them aimed at satisfying a rather specific set of user needs' (Frenken and Nuvolari, 2004). Furthermore, the importance of unsuccessful designs and outright failures has also been stressed by many researchers (Petroski, 1994) (Norman, 1988) (Michl, 2002).

DESIGN AS INTERFACE, DESIGN IDEAS AS MEMES

Already in the introduction of this paper it was stated that design is not simply about the creation of three-dimensional material objects, but is concerned with the generation of a wide range of artifacts, including environments, systems, processes, etc. As Katz argues, no matter how it is defined or delimited, design is ultimately about interface in the broadest sense of the term, or, in other words, the point of contact between the technical artifact and its human user. This implies that design is, by its very nature, concerned with the cultural assimilation of technology (Katz, 1997). Bonsiepe too suggests that interface can be interpreted as a central category of design. The interface is the central domain on which the designer focuses attention and it determines the scope for action by the user of products (Bonsiepe, 1999). Designing does not primarily have to do with specifying the formal attributes of an artifact or system, as in the case of conventional art and design historical understanding, but with expressing the cultural content of this artifact or system. In this sense, it may be further argued that the history of design could be conceived as a history not of objects but of ideas. In a talk delivered in 1990, designer Tibor Kalman called for a history of design that would be 'a history of ideas and therefore of culture'. He claimed that a good history 'uses the work of designers not just as bright spots on the page but as examples of the social, political, and economic climate of a given time and place' (Margolin, 2002). Each object or system may thus be viewed as the realisation or manifestation of a certain idea or worldview. The same concept had been already expressed elegantly by an architectural theorist, who postulated that 'a chair is not only for sitting, but also for sitting according to the mentality of your time' (Michelis, 1959). To use Dawkins' succinct formulation, the questions of

[design] historians are mostly about vehicles – individual organisms, i.e. objects; but the questions in an evolutionary design history should be about replicators – memes, i.e. ideas (Dawkins, 1989).

Design history may then be treated as a history of ideas on how to live and interact with others, rather as a succession of forms and styles. Good designs are not ideal forms, but expressions of ideas which have evolved through adaptation processes, to fit within particular social, economic, and technological contexts. Under this perspective of artifacts as materialisations of certain ideas, the concept of meme (which was coined and first popularized by Dawkins), may prove to be useful. Dawkins started off by accepting the fundamental principle that all life evolves by the differential survival of replicating entities, such as genes, and then expanded this fundamental principle to include not only genetic transmission, but also cultural transmission. He considered these two kinds of transmission as analogous and looked for a cultural replicator that would have for the man-made cultural universe a role similar to that occupied by a gene in genetics. Dawkins introduced the concept of meme, and provided certain examples of memes: tunes, ideas, catch-phrases, clothes' fashions, and ways of making pots or building arches (Dawkins, 1989) (Silby, 2000). Langrish elaborated on the basic meme concept by examining its application to design and technology. In particular, he proposed the distinction of three kinds of memes related to cultural transmission, namely, recipemes: ideas of how to do things; selectemes: ideas that form the basis of selection; and explanemes: ideas that explain what is happening inside a 'black box', i.e. a designed system (Langrish, 1999) (Langrish, 2004). These formulations of the meme concept may have important implications for the construction of the historical understanding of design. If the products of design (widely conceived) are viewed as manifestations of ideas, then they may be considered as cultural memes. Such memes replicate and propagate in the mental space of human understanding through a complex process involving imitation, modification, and competition.

This brings to the fore complexity, another key concept for design. Nowadays, complexity comes to be considered a fundamental element of our lives, even as a new existential condition (Manzini, 1988). Complexity is central in the dynamic process of adaptation and exchange taking place in the meme pool. This process leads to a widening of the traditionally perceived areas of design activity or expertise, to encompass interdisciplinary and transdisciplinary knowledge. This in turn implies that the divide between natural sciences and humanities or cultural sciences may not be as sharp as the well-known work by Snow suggests (Snow, 1993). There is perhaps 'more than meets the eye' and there might be many bridges across the divide (Ball, 2000). Dennett argues that there is only one Design Space, and everything actual in it is united with everything else. In this single, unified Design Space, the processes of both biological and human creativity make their tracks, using similar methods (Dennett, 1995). In other words, the evolution of devices is as much a natural process as the evolution of organisms (Pye, 1978). If there is just one Design Space, in which both our bodies and minds are united under similar processes, then traditional disciplinary walls may tumble (Dennett, 1995). This is understandably a scary prospect for many people, which explains the amazing resistance, or even hostility, faced by the Darwinian idea of natural selection (Mayr, 1991). Furthermore, it implies partly why such a powerful idea goes still largely unabsorbed into popular consciousness (Dawkins, 1986) (Krimbas, 1998a) (Krimbas, 1998b). In specific peripheral contexts, the reception of Darwinian theories has been further complicated by their parallel importation

and osmosis with other foreign ideas, as well as their clash with local religious beliefs (Krimbas, 1993).

THE ANTI-STAR APPROACH

History currently holds an important but somehow ambiguous position in the design curriculum (Michl, 2002). Although it is included in undergraduate courses, it holds a rather peripheral status and the usefulness of historical understanding is undervalued (Dilnot, 1989). Michl observes that objects and their stories are often presented as belonging to the past rather than the present, and there is a widespread belief that it is possible to separate 'the present' from 'the past' (Michl, 2002). Recent developments in the field of design historical studies have perhaps insufficiently infiltrated design education, which still seems to be quite preoccupied with an emphasis on style and with design as fetish (Dilnot, 1989). Originality based on the notion of creation from scratch is still one of the most persistent in design education (Michl, 2002). Even worse, the prevailing conception of originality is a rather restricted one; originality is thought of only in stylistic terms (Pye, 1978).

A research project on professional studies for art, design and communication students confirms the dominance of the myth of the creative genius in the literature of art, design and management studies, and indicates that the concept of creativity is currently prevalent in work of government agencies, private enterprise and education. The project involved team activities which met with some resistance from the students, a fact which could be explained by the insistence of the myth of the creative artist. The strength of this myth is difficult to challenge, as it is perpetually reinforced in contemporary culture. The findings of this project highlighted the crucial, albeit neglected, role of team working for the process of creativity, and suggested that new ways to think about creativity should be considered and explored with design students. The collective aspects of product creation should be emphasised, to the expense of a star-system mentality favoured by large sectors of contemporary design practice. Teamwork, management style, environment, and appreciation of different types of creativity are all important aspects for further research in this direction (Developing Professional Studies for Art, Design and Communication Students). The complexity of the creativity phenomenon should be acknowledged by design researchers and appropriate research paths should be devised, concerning the incorporation of such findings into educational practice. Understanding the historical emergence of products within an evolutionary perspective would place design and innovation in context. Adding his own voice to this discourse, a designer and educator from the United States characterises the ideas that designers should develop their own personal voice and that originality and authenticity should be their goal as 'so last century'. He claims that design is not so much about originality, but rather about 'organizing and making, but not from scratch and always in context of use'. With reference to typeface design, he points out: 'If someone designs an original typeface, for example, they don't invent new letters; they invent new shapes for letters that we understand only because they are so similar to the shapes of letters that already exist. It is not so much the particular shapes that are important, but rather the ingenuity of the letter forms in the context of all the other letter forms that existed before, and the meaning or significance they convey in that context. Uniqueness in and of itself is not very significant, nor is it as pervasive in design as we claim it is. Invention and imagination are very important to design but they don't come out of thin air, they come from the context they were created in, not from some self-taught genius' (Mr Keedy, 2004).

When considering design history from an evolutionary perspective, educators should further stress the fundamental incompleteness of all design activity. There is an inherent imperfection in all our contrivances, and no solution will ever be the ultimate solution (Michl, 2002) (Michl, 1991). As Pye emphatically observes, 'there can be no ideal solutions; [...] design is not like that' (Pye, 1978). The increasingly interdisciplinary and complex nature of design creation should also be highlighted. The distinction of so-called 'redesign' assignments aiming mainly at visually updating solutions that already exist, and 'design' assignments, understood as addressing solutions that do not yet exist, would no longer be valid (Michl, 2002). Any assignment would be considered as embedded in the continuous and highly complex web of design ideas and solutions. The romantic idea of designing as an individual, solitary, and often heroic activity, ending in a final and supposedly perfect result, would no longer be accepted. The curriculum should be revised to render historical understanding of design more sensitive to the evolutionary perspective, and new methodologies should be devised to this purpose. Methodologies such as 'reverse engineering analysis' and 'artifact hermeneutics', suggested by Dennett, are thought-provoking and may have considerable implications in this area (Dennett, 1995). Michl comments that such methods could be very useful in demonstrating the historical structure of objects and revealing their various levels of intention (Michl, 2002). However, it should be stressed that the refutation of the idea of the 'creative genius' does not imply that the role of humans in cultural evolution is negligible. Dennett clarifies this point by demonstrating the role of human agents in devising, appreciating, and securing the spread and prolongation of cultural patterns, namely memes (Dennett, 1999). A deep evolutionary understanding of design would therefore enable students to situate their work in a wider context of creation and production. A humbler, 'non-genius' attitude, would also allow them to become better incorporated into teams and collaborate with eclectic mixtures of people. This is all the more important nowadays, as design teams tend to be multidisciplinary and highly heterogeneous.

THE OPEN SOURCE ALTERNATIVE

The importance of design history for professional practice is often underestimated. Nevertheless, an emerging model of design practice which is in line with an evolutionary interpretation of history is potentially groundbreaking. Open Source is a collective, collaborative, evolutionary process of creation, which has been successfully applied in software development and has been infiltrating the wider design community for several years (www.opensource.org). The Open Source or Free Software phenomenon, described as a new mode of production in the digitally-networked environment, enables groups of individuals to collaborate on various projects following a diverse cluster of motivational drives and social signals, rather than market prices or managerial commands. So far, Open Source has been mainly associated to software development, where it has been flourishing for more than a decade. This phenomenon has involved many thousands of programmers contributing to large and small scale projects, where the central organising principle is that the software remains free of most constraints on copying and use common to proprietary materials. No one 'owns' the software in the traditional sense of being able to command how it is used or developed, or to control its disposition. The result is the emergence of a vibrant, innovative and productive collaboration, with participants who are not organised in firms and do not choose their projects in response of price signals. In the case of Open Source, we are witnessing the emergence of a new, third mode of production, termed 'commons-based peer-production', to distinguish it from the property- and contract-based models of firms and markets. It is argued that the Open Source model has systematic advantages

over markets and managerial hierarchies when the object of production is information or culture (Benkler, 2002).

This paradigm change has been explained and illustrated on the basis of the cathedral and the bazaar analogy. On the one hand there is the 'cathedral' model, where things are created under a strictly hierarchical system. On the other hand, the 'bazaar' model is expressed by a babbling mixture of different agendas and approaches. In the latter case, users are not treated as the recipients of a finished body of work, but as co-developers with crucial contributions. When the users are co-developers, each one approaches the task with a slightly different perceptual set and analytical toolkit, a different angle on the problem. The term 'bazaar' is also related to 'agora', the Greek word for an open market or public meeting place (Raymond, 1998). For twenty years, the Open Source ideas have been building momentum in the technical cultures that built the Internet and the World Wide Web and now they are breaking out into the commercial world. Open Source has been so far usefully applied in many areas of cultural and industrial production including art, music, and literature (Albert, 1999). It has been suggested that software is just the beginning of a much wider and far-reaching application of the Open Source principles in various domains. This could have a profound influence on the system of production and distribution of goods in general, as Open Source is doing for mass innovation what the assembly line did for mass production. Far from what its opponents claim, this model is in fact a return to basic free-market principles, as it fosters competition, creativity and enterprise. Production is driven by people working unencumbered by patent restrictions, in a cottage industry fashion within a knowledge-based economy. Furthermore, it allows for the development of different notions of property, which becomes something to distribute rather than protect (Albert, 2003) (Krippendorff, 2004).

This model is totally compatible with an evolutionary understanding of the history of man-made artifacts. Applications of the Open Source paradigm in a design context reveal that the idea has already been taken up by the design community in different circumstances. The new mentality has been identified as potentially significant for future developments in various design contexts (Thackara, 2002). The design thinker John Christopher Jones declares that his digital diary has been created in the spirit of Open Source (Jones, 2002). Recent initiatives suggest that open models inspired by and based on the Open Source philosophy may inform the system of refereeing practices and design publications which underpin design research (Friedman, 2003) (Rust, 2003). Perhaps the most advanced application of Open Source in a design context is ThinkCycle. ThinkCycle is an academic, non-profit initiative engaged in supporting distributed collaboration towards design challenges facing underserved communities and the environment. This initiative seeks to create a culture of Open Source design innovation, with on-going collaboration among individuals, communities and organisations around the world. ThinkCycle provides a shared on-line space for designers, engineers, domain experts and stakeholders, to discuss, exchange, and construct ideas towards sustainable design solutions (www.thinkcycle.org). The Open Source design model constitutes a sustainable path for the future, both in design and usage terms. In design terms, a distributed, collaborative process would enable the optimisation of resources consumed and, at the same time, ensure the acceptability of the design by the widest range of stakeholders. In usage terms, it might imply the widespread access to services rather than purchase of products, also leading to substantial preservation of scarce resources. The emphasis would shift from acquisition and property of goods to creation and enjoyment by everybody, not simply for the selected few. The implications are

far reaching and should be further explored in all aspects of design practice and research (Yagou and Zavras, 2003). This alternative model does not claim the utopian power to abolish conventional, commercial models, but could operate in a complementary fashion with them.

CONCLUSION

Studies of design from an evolutionary perspective have been around for some time, and have given some fascinating and increasingly more credible results. In proper (neo-)Darwinian fashion, this paper has drawn from a wealth of sources, in order to build up an outline of evolution-based studies of design. However, the core purpose of this paper was not to review evolutionary approaches to design, but to highlight the theoretical and practical opportunities that these approaches open up for design. The evolutionary perspective proposed points to the need of actually reevaluating our historical understanding of products, reinterpreting the history of industrial design, and indeed rewriting design history to accommodate a wider conception of the nature and role of artifacts. In particular, this paper has emphasised the potential implications for education and, consequently, for design praxis. Unless an evolutionary perspective of design history enters the mainstream of design education and practice, we may not expect any distancing from superficial, purely commercial design endeavours, neither any substantial improvement of the quality of design addressing social needs. Rethinking design history from an evolutionary perspective appears to be a path which is intellectually and practically challenging, and certainly worth following. Among other things, it would infuse a degree of humility into the inflated world of much contemporary design.

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