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The Design Methods Movement: From Optimism to Darwinism

John Z. Langrish

Salford University
jlangrish@aol.com

Abstract: The past, of course, is a foreign country with different values and practices. When the Design Research Society (DRS) was born in 1966, things were very different from now. It grew out of the Design Methods Movement (DMM), itself a product of post war optimism and belief in science-based progress.
This paper is in four parts, describing -
1. The post-war optimism of the 1950s
2. The DMM and its role in the formation of the DRS.
3. The end of optimism and the replacement of belief in scientific progress by a suspicion of science and a search for alternatives.
4. An alternative approach in which biology is shown to be a better model than physics when attempting to make design 'scientific'. This involves a generalised Darwinism with different kinds of memes as imperfect replicators.

Keywords: design methods, evolutionary design, memetics, history.

Introduction

The Design Research Society (DRS) was officially formed at a conference in 1966. It did not suddenly appear out of nothing like a Hollywood mutation. It emerged from the activities of an existing group of people known collectively as the Design Methods Movement (DMM).

The DMM itself was the result of post war optimism and a belief that making design more scientific would help to produce a better world. However, it became clear that real world problems were 'wicked', requiring a different approach from the application of scientific techniques developed during World War II.

The DMM and its demise are of more than historical interest because design today has still not achieved the scientific approach that was looked for. This paper seeks to show that the way forward for design is the realisation that biology is also a science and that the strategies of biology offer a much better model for design than the imitation of physics.

The paper starts with an account of the optimism that formed the intellectual climate for the DMM. People born since 1970 have not lived through such a period and the DMM cannot be understood without awareness of the effect of scientific optimism on design. The loss of this optimism led to a search for alternative design methods and the paper describes a Darwinian approach involving different kinds of memes as imperfect replicators.

The optimism of the 1950s

Following recovery from the depression of the 1930s and the world war of the 1940s, the Festival of Britain in 1951 was a celebration of optimism and belief in scientific progress. Designers from London’s Royal College of Art used electron microscopic images that were turned into designs for wallpaper, curtains, ties, tablecloths etc. The red spheres connected by black rods, as used in atomic models, cropped up as legs for paper holders and clothes-hooks. Science was seen as producing antibiotics, synthetic fibres, thermoplastics, TV, computers etc leading to a healthier and more colourful way of life.

People who were alive in the 1930s and 1950s knew that those twenty years had made an enormous difference. Antibiotics cured infections that killed in the 30s. Going to work on a bicycle or by public transport was increasingly replaced by the availability of affordable new car designs. In the UK, the late 50s saw the Morris Mini Minor and the Austin Seven, which became the Austin Mini, available for £500. Expensive silk stockings were replaced by cheap nylon ones. Grimy metal washing up bowls were replaced by shiny red plastic ones produced cheaply by injection molding. There were many such changes and they had one thing in common; they were believed to be the product of ‘science’. It was not very clear what was meant by ‘science’ but as represented in films of the time, it often involved men in white coats working in laboratories where things bubbled in glass containers.

However, even in 1951 with the Festival of Britain celebrating new technology and science, there were warning notes. Was new technology entirely a blessing? A 1951 film, *The Man in the White Suit,* starred Alec Guinness as Sidney Stratton who invented a self-cleansing white fibre used to make suits that stayed clean and did not wear out. This film was unusual because it showed both unions and factory owners resisting the innovation - suits that don’t wear out are bad for business and for jobs. Despite the bubbles in his laboratory, Sidney’s invention was not ‘a good thing’.

Nonetheless, believing that ‘science’ was producing a better world, both industry and governments invested in R & D and it was not until the late 1960s that suspicion of new technology began to be more common than the earlier optimism.

Freeman (1983) claimed that periods of optimism cropped up every fifty years based on the economic Kondratief cycles and divided into four phases, recovery and prosperity followed by decline and depression. The effect of such cycles on design was studied by looking at adverts. Langrish (1982) claimed that in phases of recovery and prosperity, there is an atmosphere - a zeitgeist - of optimism, accompanied by a belief that science is making things better. However in the decline and depression phases, optimism is replaced by pessimism and a loss of faith in science. This was reflected in the designs of the different phases as shown by both words and pictures used in adverts. Modern definitions of biological evolution state, “change in the frequency of genes in a population” and by analogy the advert study looked at frequencies of forward looking and backward looking adverts in the different phases. In optimistic phases, there is a frequent use of words such as new, latest, scientific and so on but in pessimistic phases, words such as traditional, reliable, original, established etc. are more frequent. This also applies to images in adverts. As an example, bread was advertised before 1913 as ‘untouched by human hand’, accompanied by a picture of ‘our latest patented machinery’. This was in a phase of optimism following recovery from the depression of the 1890s. In contrast modern bread adverts tend to suggest that the bread is made in a farmhouse kitchen.

The scientific optimism of the1951 festival was in sharp contrast to London’s millennium exhibition, 50 years later. If the 50-year cycle had continued, the year 2000 would have seen the start of another period of optimism. However, the year 2000 did not seem to generate any belief in progress and the main scientific display of the 2000 exhibition was introspective - how does my brain work - being more interesting than how does the universe work. The past is indeed a foreign country and the DMM has to be understood as an outcome of the scientific optimism of that time, a time that people aged under fifty will not have experienced.

The Design Methods Movement (DMM)

The DMM is usually described as the outcome of work by four people, Bruce Archer, John Chris Jones, Christopher Alexander and Horst Rittel but others were involved. They were attempting to use techniques developed during the war to make design more ‘scientific’ in areas such as industrial design, architecture and town planning. J Christopher Jones was a lecturer in industrial design at the University of Manchester’s Institute of Science and Technology (UMIST) where he ran a Master’s course in design. He had formerly worked in industrial design and ergonomics in the electrical industry (EMI). Jones was aware that there was a growing international interest in trying to make design more ‘scientific’ and he was able to obtain the support of Imperial College, London, in organising a conference in 1962. The proceedings were published as - *Conference on Design Methods: papers presented at the conference on systematic and intuitive methods in engineering, industrial design, architecture and communications, London, September 1962,* Edited by J Christopher Jones and Denis Thornley, Pergamon Press, Oxford, London, New York and Paris, 1963.The co-editor with Jones was Denis Thornley, a senior lecturer in the Department of Architecture, Manchester University and a visiting lecturer at the Hochschule für Gestaltung at Ulm, West Germany.

Bruce Archer had also been a visiting instructor at the Ulm School of Design. Bruce was an engineer who became head of design research at London’s Royal College of Art. He produced a series of twelve articles called *Systematic Method for Designers,* published in *Design* magazine.

Archer, Jones, Thornley and others formed a committee to organize the 1962 design methods conference. Its chair was J K Page, professor of building science at Sheffield University and it was this group that went on to found the Design Research Society in 1966.Links between the Ulm design school and England were important. The Ulm influence spread to the USA in 1963 when William Wurster, Dean of the College of Environmental Design at Berkeley, California, recruited Hors Rittel from Ulm where he had been Professor of Design Methodology. Rittel was appointed Professor of the Science of Design. He attempted to describe the process of design in terms of successive phases that he described as being like box-cars. His first in the line was 'understand the problem'.

Wurster also recruited Christopher Alexander who had been born in Austria but studied both maths and architecture in England at the University of Cambridge. He had then gone to Harvard where he obtained a doctorate in architecture. After winning a prize for his paper "A city is not a tree" he published *Notes on the Synthesis of Form* (1964). This starts with the words, "These notes are about the process of design: the process of inventing things which display new physical order, organization, form, in response to function." Having degrees in both maths and architecture, Alexander was able to produce an approach, based partly on set theory, that broke down design problems into subsystems, allowing for an incremental approach.

The published proceedings of the 1962 conference contain 17 papers. Contributors included the above-mentioned Jones, Thornley, Page, Alexander and a paper by Joseph Esherick who was professor of architecture at Berkley's College of Environmental Design, encompassing architecture, landscape architecture, environmental planning and city planning. At the time of the 1962 conference, it seemed that an international group of people were going to make the process of design much more 'scientific'. However, forty years later, Chris Jones could write

"To me it was an historic moment in which I fancied that the world of design and with it the future on earth was eventually going to be a better place than it was because of big (and I supposed beneficent) changes that could come of a change of method throughout the design professions... Ah, but that didn't happen. What a disappointment!" Jones 2002

The optimism of 1962 can be seen as having three layers.

1. A general all-purpose optimistic zeitgeist that saw the world as getting better than it had been.

2. A belief that the process of designing had an important part to play in this 'getting better'.

3. A belief that the design process could itself be made better through becoming more scientific.

All three layers turned out to be disappointments. The post-war optimism evaporated and the belief in scientific progress was replaced by a distrust of ‘science’. For example, Victor Papanek (1988) kept alive the belief that design could make a better world but he was against the so-called rational approach, using “rules, taxonomies, classifications and procedural design systems”. He criticised this approach, “such a method leads to reductionism and frequently results in sterility and the sort of high-tech functionalism that disregards human psychic needs at the expense of clarity”.

The End of Optimism

In 1960’s USA, belief in scientific progress began to be threatened. Mathew Wisnioski (2012) dates the start of this change as 1964 – two years after the publication of Rachel Carson’s Silent Spring and the year in which Ellul’s The Technological Society appeared in English translation. Wisnioski sees these two events as representing two strands of growing concern, pollution as a side effect and the system itself. This system was the government-funded aerospace industry that employed the majority of America’s growing number of engineers and neglected traditional manufacturing.

1967 can also be seen as a turning point. This was the year when government expenditure on science in both the USA and the UK stopped growing so rapidly. (The 2nd order differential went through a maximum) Against this background of a change in zeitgeist, the people associated with the DMM changed their minds.

The most dramatic change happened to J Chris Jones. In 1970 he published *Design Methods: seeds of human futures.* This was purchased by students in design colleges who hoped that it would tell them how to design. Also in 1970 he was appointed as the first Professor of Design at the Open University. From 1971-73 he was Chair of the Design Research Society and he seemed to be turning into a senior establishment figure. BUT then in 1974 he resigned from his university position and went to live in a commune writing poetry and experimental forms of writing. This was rather like the bishop in a little known novel by H G Wells (1917) in which an Anglican bishop decides that he no longer believes in God so resigns as bishop much to the annoyance of his wife. (H.G. Wells. *The Soul of a Bishop*. Macmillan 1917).

Fortunately, Chris Jones had founded a flourishing department in the Open University and it continued in his absence, partly as a result of recruiting two of his Master’s students from Manchester. Nigel Cross, an architect, became a lecturer in design at the OU in 1970 and Robin Roy, a mechanical engineer, also became a lecturer in design in 1971. Both eventually became Professors and Nigel Cross has been chief editor of the *Design Studies* journal for many years.

Christopher Alexander also seemed to change his mind away from the optimism of the 1960s. In the new preface to a 1971 edition of *Notes on the Synthesis of Form,* Alexander repudiated the DMM -

"Since the book was published [in 1964], a whole academic field has grown up around the idea of the leading exponents of these so-called design methods. I am very sorry this has happened and want to state publically that I reject the whole idea of design methods as a subject of study, since I think it is absurd to separate the study of designing from the practice of design."

The relationship between research and practice is a lively topic for discussion in many areas. For example, the sociology of religion is an attempt to understand why so many different societies have all had some form of religion but most people who experience the practice of religion find such attempts to be either offensive or just silly. Similar debates have taken place in the history of science.

Not everyone agreed with Alexander's claim that design research could not be separated from design practice. Rittel (1972) still attempted to use a systems approach in design but he realised the need for something new and came up with his "Some Principals of the Systems Approach of the Second Generation". This came after he had established his ideas of 'wicked problems', problems that were so complex that they resisted a simple first generation systems treatment. He divided problems into 'tame' and 'wicked' with tame problems capable of being tackled by a 'box-car' line of sub-problems, starting with 'understand the problem'. Rittel (1972) claimed that wicked problems can't start with understanding because you only understand a wicked problem when you have solved it.

More recently, Chow and Jonas (2008) have suggested that Rittel's 'second generation' needed to be resurrected. They claim, "The fierce rejection of 1st generation design methods in the early 1970s resulted in the postmodernist attitude of "no methods", They add

> "The potential of the early (1st generation) methods is neglected and the practical usefulness of design research is impeded. The suggestion for 2nd generation methods as discussed by Rittel and others has hardly been taken up in design."

To remedy this deficiency they describe a rather complicated methodological tool MAPS1 that seems to share with the DMM a belief that 'scientific' means like physics. Physics is at its best when dealing with simple systems; simple in the sense of having consistent causation operating on a few variables. However, systems containing forms of life are characterized by complexity and variety - no two living things are identical. Such systems need a biological approach based on variety and change over both time and space.

A Biological Approach

5.1 P v B

A classical physics type world-view (abbreviated to P) is not appropriate for complex problems such as Rittel's 'wicked' problems. (If you cannot understand a wicked problem, you can not imitate a physics type solution). The failure of the P view meant that the DMM had to either give up the attempt or modify their P view into something else. What they did not do was realise that physics is not the only science. Biology is also a science with a different way of looking at the world (abbreviated to the B view)

These two world-views, P and B, differ in many respects. P has forces; B has interactions. P is best for simple systems. Rittell's wicked problems are problems of complexity and biology is the science that has learned how to cope with complexity.

The P view is based on the assumption of consistent causation that is P looks for causes having effects such that when the circumstances are consistently repeated, the same result will be obtained independently of time or place. A carbon atom is seen as being the same as any other carbon atom, light years away or millions of years in the future. This means that the P view is not historical. In contrast, the B view sees that no two entities are identical with the results that causation is not consistent and the future is uncertain. Any account of living entities has to take into account their evolutionary past.

As stated by the evolutionary biologist, Ernst Mayr, (1976)

> "The goal of the physicist is to establish general laws and to reduce all phenomenon to a minimum number of such laws. General laws, however, play a much smaller role in biology. Just about everything in biology is unique: every animal and plant community, fauna or flora, species or individual. The strategy of research in biology must for this reason be quite different from the strategy of the physicist."

The idea that a B view could help in making design more scientific almost occurred to two of the above four founders of the DMM. In the 2nd edition (1992) of Design Methods with much additional material, Chris Jones claimed that the breakthrough in design came with the invention of the pencil because this allowed designers to try out many more ideas and discard the bad ones much more quickly. Having a variety of ideas and discarding the bad ones can be seen as a version of survival of the fittest (and extinction of the less fit) but Jones was looking for something that was not 'science' - either B or P. Many years later, he wrote, Jones (2000).

> "I'd like to correct a misconception: when in the 1970s I criticised and appeared to leave design research it was not because design methods had become rigid tools that inhibited the imaginative skills of individual designers - it was because I was angry, and still am, at the 'inhumanity' of abstract design language and theories that are not alive to all of us as people, or to actual experience - and which threaten to reduce the reality of life to something less than human."

Alexander was also aware that changes in design could be described as 'gradual change within a tradition, leading to adaptation'. This sounds like Darwin's descent with modification but Alexander classed such an approach to design as 'unselfconscious design' in contrast to his hoped for 'self-conscious design'. In self-conscious culture - "form making is taught academically according to explicit rules". Presumably one aim of design research is to discover these 'rules' so that they can be taught. His mind was so wedded to a P view that even within unselfconscious design, he clearly rejected a Darwinan approach. In *Notes*, Chapter 3 (p 30 - 31), "The Source of Good Fit", he described the Mousgoum hut, built by African tribesmen in the northern sector of French Cameroon, where everyone built their own hut using knowhow passed on from family and neighbours (including knowledge of mistakes). These huts fit with other huts, reflecting a social order and producing what he calls 'coherence'.

He used 'unselfconscious' to describe the process that produced this fit and claimed that unselfconscious culture passes on by imitation and correction leading to coherence. This may seem to resemble a B view but Alexander rejected what he called 'the myth of architectural Darwinism'. (He also rejected 'the myth of the primitive genius'). In place of Darwinism, Alexander suggested an old idea - "a homeostatic (self-organising) process that consistently produces well-fitting forms, even in the face of change." His source for this idea of a self-organising adaptive system was the American physiologist, W B Cannon. (1932)

Whilst the founders of the DMM modified their aims, the idea of making design more like physics is still very popular. Rittell's 'box cars' have become boxes connected by arrows - going in all directions - to produce those diagrams that litter many of the pages of the management literature.

Alexander's alternative to 'architectural Darwinism' has become the search for some kind of order in complexity. A popular account of this search has been given by Stuart Kauffman (1995) who claims

> "Maybe principles deeper than DNA and gearboxes underlie biological and technological evolution, principles about the kinds of complex things that can be assembled by a search process and principles about the autocatalytic creation of niches that invite the innovations which in turn create yet further niches."

Kaufman refers to 'order for free' and suggests that 'Man is expected in the universe', as suggested in his title, *At Home in the Universe.* To me, the principles that are deeper than DNA and gear boxes are the principals of a general theory of Darwinian change in which biology is a special case along with language, gear boxes and many other products of human activity. The attempt to make the study of complex adaptive systems into something like physics will fare no better than the early attempts of the DMM. Complex systems need a B view, as suggested by Charles Darwin (1859).

5.2 Darwin on complexity.

Charles Darwin was very aware of biological complexity. In his 1859 Origin of Species he referred to

> "the infinite complexity of the relations of all organic beings to each other and to their conditions of existence, causing an infinite diversity in structure, constitution and habits."

When this diversity is subject to competition within a selection system, the result is what Darwin (1859) called, "descent with modification under the influence of natural selection". (He did NOT use the word 'evolution').

> "if variations useful to any organic being do occur, assuredly individuals thus characterised will have the best chance of being preserved in the struggle for life and they will tend to produce offspring similarly characterised." (p 99 1st ed.)

Complex systems have some stability - otherwise they would not be 'systems'. They also change over time and Charles Darwin had a special insight into the nature of change in biology.

> "If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous successive, slight modifications my theory would absolutely break down." (6th edition p137).

You can't be much clearer than that. For 'complex organ' substitute 'complex system' or 'radical innovation' and it becomes obvious that Darwinians cannot accept the division of technological change into 'incremental and radical innovation', the title of a recent paper by Norman and Verganti (2014). From a Darwinian perspective, all change in a complex adaptive system has to be incremental. (Langrish 2014). The concept of descent with modification did not originate with Darwin; the descent of modern languages from a few classical languages was studied in the 18th century, leading to the idea of a common ancestor in a hypothetical Indo-European language. Also, It was known to animal breeders and horticulturalists centuries before Darwin's birth and his *Origin* starts with a discussion of pigeon breeding that he called artificial selection. Darwin's achievement was to provide a mechanism - selection between competing varieties, followed by many more rounds of competition leading to the appearance of design in nature. The same mechanism can be applied outside biology - not by crude analogy but by recognition that this is how complex adaptive systems have to change.

5.3 A neo-Darwinian general theory of change.

Two additions to Darwin's ideas have been made to produce a modern neo-Darwinian evolutionary biology and a third is needed for a general theory of change in complex systems. First we have to add symbiosis. Darwin's 'tree of life' has branches representing descent from a common ancestor. A single species slowly becomes changed over time and if part of the species becomes separated from the main body, then over time the separate group can become its own new species. Lynn Margulis (1998) has shown that new forms of life can come into being by a combination of existing forms. This is not branching; this is symbiosis of two different life forms to produce a new form. The concept of a species as an interbreeding group is not required for asexual reproduction. Life evolved on earth for about a billion years before sex arrived. This means that technological change can be discussed without the need for a 'species'. Much innovation stems from symbiosis, the joining of one part of technology with some other part, described by philosopher Daniel Dennett (1995) as 'designed elsewhere' meaning that two separate streams of design can be joined together.

The second component of neo-Darwinian theory is genetics. Darwin knew that descent required a something that was passed on but genes were not discovered until after his death. He did suggest that things called gemules were passed on but this idea turned out to be erroneous. Darwin occasionally used the word 'genetic' but this was in its original sense of an adjective derived from genesis, meaning passed on at birth or innate but with no knowledge of just what was being passed on.

A neo-Darwinian general theory for use outside biology needs to specify the nature of 'passing on'. Technology does not have genes but it does have what Richard Dawkins calls imperfect replicators. Replicators are passed on. They are 'imperfect' in the sense of being subject to change, producing 'descent with modification'. Dawkins (1976) provided a name for the imperfect replicator in cultural evolution, his word, 'meme' (pronounced to rhyme with cream) has now entered the Oxford English Dictionary (OED) and given birth to memetics, the study of memes.

At first, it seemed that memetics would provide an interesting way of studying technological change but this did not happen. A new electronic journal, The Journal of Memetics, eventually ceased publication and interest declined. The main reason for this lack of growth was the adoption of a P view by people attempting to apply memetics. Like the founders of the DMM, they did not realise that change in complex systems needs a B view. They saw memes as units with one method of transmission, imitation. They tended to see a simple cause and effect with memes producing 'infection' of our brains until resistance was acquired. Typical of this approach was Susan Blackmore's (1999) The Meme Machine in which imitation is stressed even though the author is unable to define the term other than saying 'the meaning of the word meme is that which is imitated' The OED definition also reflects this P approach, "meme: An element of a culture that may be considered to be passed on by non-genetic means, esp. imitation." Blackmore includes scientific theories as an example of memes but how do you 'imitate' a theory of gravity? She describes humans as 'copying machinery' for memes and claims 'there is an evolutionary arms race between us and the memes that we find ourselves copying". This concept is an example of what philosopher Daniel Dennett (1995) has called 'memes versus us', a concept that Dennett demolishes, pointing out that the nature of 'us' has itself been formed by memes.

In contrast, a B view of memetics looks for different kinds of memes that are not 'units'; they are patterns having different methods of transmission and having different kinds of results. Such a B view has been described elsewhere, (Langrish 1999), involving memes as patterns of thought and three kinds of memes, recipemes (how to do things), selectemes (what sort of things you want to do, notions of 'betterness' and desirability) and explanemes that explain how recipes produce their results, ranging from scientific theories to ancient myths and needing a language for their reproduction. Newton's law of gravity is an explaneme. It is passed on using maths and words. It is not imitated. Further discussion of the role of explanemes is outside the scope of this present paper but see Langrish (2004).

Dawkins has now accepted the idea of memes as patterns. In a revised edition of The Selfish Gene (1989) he states

> "If memes in brains are analogous to genes they must be self-replicating brain structures, actual patterns of neuronal wiring-up that reconstitute themselves In one brain after another. I had always felt uneasy spelling this out aloud, because we know far less about brains than about genes, and are therefore necessarily vague about what such a brain structure might actually be. So I was relieved to receive recently a very interesting paper by Juan Delius of the University of Konstanz … publishing a detailed picture of what the neuronal hardware of a meme might look like." (1989 p 323.)

Although, Dawkins has now recognized the importance of patterns, he is still inclined to think in P terms. Memetic patterns are not 'hardware'; they are temporary circuits formed by interactions between neurons.

Human brains have a remarkable mechanism for responding to the masses of incoming sensory data that they perceive. When faced with another human being, the brain turns incoming data into a 'pattern'. Attempts to develop computer systems capable of recognizing people have not been able to match the human ability to recognize familiar people through a glimpse of part of their face, the way they walk, the sound of their voices etc.

When a brain recognizes the pattern of something in its environment, it triggers a response from selecteme circuits that can signal danger, desirability, 'could be useful' etc. These in turn trigger recipeme circuits that initiate action. If a potential prey recognizes the pattern of a predator, it flees. If it senses a source of food, it turns towards it. This combined action of selectemes and recipemes can be called 'purposive pattern recognition' or PPR for short. The recognition of patterns can convey what to do next; it is purposive and PPR can be used to describe how experienced designers make decisions as shown in a PhD thesis. (Abu-Risha, M. 1999).

5.4 Postscript

The DMM was a group of experienced designers who believed that they knew how the process of design could be improved and wrote down 'how to do it'. They were influenced by the scientific optimism of that time. When optimism evaporated, they changed their minds in different ways but moved on to support design research. Two different aspects of being 'scientific' need to be differentiated. The first was the idea that the design process needed to be made more 'scientific' - more like physics with the identification of basic causes leading consistently to desirable results. The second aspect was the nature of research - also in imitation of physics. The biological alternative involves an evolutionary account of the design process and the use of case studies as an important method.

Mayr 1982 claimed,

> "In evolutionary biology almost all phenomena and processes are explained through inferences based on comparative studies. These in turn are made possible by very careful and detailed descriptive studies. It is sometimes overlooked how essential a component in the methodology of evolutionary biology the underlying descriptive work is." Mayr 1982 p 70

In design research, the 'underlying descriptive work' consists of case studies. Way back in 1969, I won a prize for some case studies of technological innovation and I gave a lecture on the results. J Chris Jones brought some of his MSc students to hear the lecture. One of these was Robin Roy (still known as Rabindathra in those days) and later when he moved to the OU he decided to do some case studies of good design. My case studies had used innovations produced by organisations awarded the Queens Award to Industry for Innovation so Robin looked for a similar award scheme in design. However his original idea of using the Design Council award scheme was abandoned because most of those award winners had not made a profit on their award winning designs and it was believed (erroneously) that the Design Council was more interested in 'the best possible taste' than in making a profit. He eventually published a paper on his case studies and this paper won an award for best paper of the year in Design Studies.

Case studies demonstrate the diversity of ways in which things manage to happen. They show that the wondrous process of design is not reducible to some simple linear process, capable of planning, forecasting and management (though humans being human, they will continue to try). We need to be much more modest in our beliefs that intentionality, rationality, reason, scientific understanding, good design and so on can lead to better things but we have to keep trying.

The end of optimism.

References

Abu-Risha, M. (1999). *Purposive Pattern Recognition*. PhD thesis, De Montfort University.

Alexander, C. (1964). *Notes on the Synthesis of Form*. Harvard U P. Blackmore,S. (1999). *The Meme Machine*. Oxford UP.

Cannon, W. B, (1932) *The Wisdom of the Body*. London. p 38.

Darwin, C. (1859). *The Origin of Species By Means of Natural Selection*. London: J Murray.

Dawkins, R. (1976). *The Selfish Gene.* Oxford U P. Chap 11. Revised edition (1989) p 323.

Dennett, D. C. (1995). *Darwin's Dangerous Idea: Evolution and the Meanings of Life.*

London: Allen Lane/Penguin.

Freeman, C. et al. (1983). *Unemployment and Technical Innovation: a Study of Long Waves in Economic Development*. London: Frances Pinter.

Frith, Chris (2007) *Making up the Mind: How the Brain Creates our Mental World.*

London: Blackwell. p 67.

Ginsberg, A. D. et al. (2014) *Biology's Designs on Nature*. MIT Press.

Kauffman, S. (1995). *At Home in the Universe*: *The search for laws of complexity*. Oxford U P. p281.

Jones, J. C. (1970). *Design Methods: seeds of human futures.* New York: John Wiley. Jones, J. C. (1992). *Design Methods,* 2nd edition with additional text. John Wiley Jones, J. C. (2000). Theory of Designing. From http://www.publicwriting.net/2.2/theory_of_designing.html accessed May 2014.

Langrish, J. (1982). "Cycles of Optimism in Design". *Design Studies Journal*, July.

Langrish, J. (1999). Langrish, J. "Different Types of Memes: Recipemes, Selectemes and Explanemes" *Journal of Memetics 2*, 1999.

Langrish, J Z. (2004). "Darwinian Design: The Memetic Evolution of Design Ideas." *Design Issues 20* Issue 4.

Langrish, J. (2012)

Langrish, J Z. (2014). Incremental and Radical Innovation: A Response by John Z Langrish. *Design Issues.* June 2014*. 30* No3 104-106.

Margulis, L (1998). *Symbiotic Planet : A New Look at Evolution,* Basic Books.

Mayr, E. (1976). *Evolution and the Diversity of Life: Selected Essays.* Harvard U P. p 14.

Mayr, Ernst. 1982. *'The Growth of Biological Thought: Diversity, Evolution and Inheritance'*. Cambridge: Harvard U P.

Mensch, G. (1979). *Stalemate in Technology: Innovations Overcome the Depression.*

Cambridge MS.

Munro, Thomas. (1961). Do the Arts Evolve? Some Recent Conflicting Answers.

Journal of Aesthetics and Art Criticism; Summer 1961. 407---417.

Norman, D. A., Verganti, R. Incremental and Radical Innovation: Design Research vs. Technology and Meaning Change*. Design Issues.* Winter 2014, Vol. 30, No. 1: 78–96.

Papanek, V. (1988). The future isn't what it used to be. *Design Issues* **V** pp. 4---17.

Papanek, Victor (1971). *Design for the Real World: Human Ecology and Social Change*, New York, Pantheon Books.

Rittell, H. (1972) On the Planning Crisis: Systems Analysis of the 'First and Second Generations' in Protzen, J and Harris, D. (2010). *The Universe of Design: Horst Rittel's Theories of Design and Planning.*

Steadman, P. (1979). *The Evolution of Designs: Biological analogy in architecture and the applied arts,* Cambridge University Press, Cambridge. (2008) Revised edition, Routledge. Abingdon and New York. Main text is the same but a new 'Afterword', pp 241---248, includes memetics.

Veblen, T. (1898). "Why is economics not an evolutionary science?," *Quarterly Journal of Economics*, 12(4): 373---397.

Wisnioski, M. (2012). Engineers for Change: Competing Visions of Technology in 1960s America. Cambridge MA, and London: MIT Press.

About the Author:

John Z Langrish was Dean of Manchester's Institute of Advanced Studies. Author of *Wealth from Knowledge* and many papers on science policy, innovation, design management and Darwinian change. Supervised and examined over 50 PhDs. Treasurer of DRS