# ARCHITECTURE AND SECOND ORDER SCIENCE

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## ABSTRACT

Since around 1980, Ranulph Glanville has put forward the idea that rather than seeing research in design as one form of science, we instead see scientific research as a specific form of design. This argument, based on the way that scientific research inevitably involves design activity but not vice versa, and others like it around that time consolidate a shift during the 1970s in thinking about design, from a concern with the scientific method to the idea that design has its own epistemological foundations as a discipline. The attempt to base design on a linear version of the scientific method failed for reasons that have been pointed out by Horst Rittel amongst others: because design involves the creation of the new, design questions cannot be exhaustively formulated in advance. This has marked something of a parting of the ways between design and science as being incompatible in terms of method.

Given Glanville's argument this is not what we might expect: if science is a limited form of design, shouldn't scientific approaches be commensurable with design even if they are not a basis for it? This apparent disjunction is only the case if we follow the changes in how design was thought about during this period without also following the comparable changes regarding science. Both broadly parallel each other, moving from a concern with method in the 1960s through a critique of this in the 1970s to new foundations from the 1980s onwards, focusing on what designers and scientists actually do in practice. Indeed the key critiques of method advanced by Feyerabend and Rittel, in science and design respectively, have similar structures and, so, what seems at first sight to be a rupture can also be read as a parallel journey.

Using this account as a basis, and in the light of recent discussions regarding the idea of second order science, I suggest that we can understand contemporary design research as one example of second order research practice, as is indicated by its continuity with cybernetics. More speculatively, and with reference to the Fun Palace project of Joan Littlewood and Cedric Price, to which Gordon Pask also contributed, I suggest that architecture can itself sometimes be thought of as facilitating such a reflective and participatory enquiry.

Keywords: Architecture, Design, Cybernetics, Second Order Science

## INTRODUCTION

The relationship between architecture and science has come in and out of focus over recent decades and, indeed, over recent centuries. In this working paper I review some aspects of this relationship that are pertinent in the light of current discussions regarding second-order science. I go on to suggest that we understand contemporary practice based design research as one example of second-order research practice, as is indicated by its continuity with cybernetics. More speculatively, and with reference to

the Fun Palace project of avant-garde theatre producer Joan Littlewood and architect Cedric Price, to which cybernetician Gordon Pask also contributed, I suggest that architecture can itself sometimes be thought of as facilitating such a reflective and participatory enquiry.

## METHOD AND PRACTICE IN DESIGN AND SCIENCE

During the period of scientific and technological optimism that followed the Second World War, there was a tendency to see design as something that should be put on rational scientific foundations. This is most clearly evident in the design methods movement, which attempted to systemise design as a logical process modeled on the scientific method, but also as a longstanding concern in architecture in its relationship to technology and rationalism. Since around 1980 this view has been countered by arguments that have seen design as a discipline in its own right and so as being of the same status as science rather than something to be corrected by it. Amongst these, the account developed by Ranulph Glanville (1981, 1999) is particularly strongly framed, reversing what had been the more usual hierarchy. Rather than seeing design research as one specific form of scientific research, Glanville argues that, instead, we can see science as a specific form of design enquiry. This follows from the way that scientific research inevitably involves design activity, for instance in devising and setting up experiments, but not vice versa. Design is therefore the more general case and so, Glanville argues, if there is to be any hierarchy between the two then design should be given priority. This argument and others like it around that time, such as those of Bruce Archer (1979), Nigel Cross (1982) and Donald Schön (1983/1991), consolidate a shift during the 1970s from trying to base design on the scientific method to the idea that it has its own epistemological foundations, independent of science.

The attempt to order design according to a linear version of the scientific method, understood as moving from analysing the problem at hand to testing and optimising solutions to it, failed for reasons that seem obvious in retrospect: because design involves the creation of new situations, design questions cannot be fully formulated in advance but shift and change as they are explored and as proposals are enacted. One of the most important accounts of these limitations is that developed by design theorist Horst Rittel, who, writing with the urban designer Melvin Webber, characterised the situations which designers (more specifically planners, but the point is generally applicable) encounter as "wicked problems", the complex interdependencies of which make them unsolvable using conventional linear problem solving (Rittel & Webber, 1973).

On the face of it, Rittel and Webber's observations mark an incompatibility between design and science in terms of method. Indeed the exhaustion of design methods, with leading figures such as Christopher Alexander, J Christopher Jones and, indeed, Rittel distancing themselves from it during the 1970s (as noted by Cross, 2007, p. 42), was one part of the unraveling of modernism more generally and marks something of a parting of the ways between design and science. However, given Glanville's argument noted above, this is not what we might expect: if science is a limited form of design, shouldn't scientific approaches be commensurable with design even if not a basis for it? This disjunction is only the case if we follow the changes in how design was thought about during this period without also following the comparable changes regarding science. Indeed, as Glanville (1999, p. 80) notes, the version of science that was applied in design methods was distant from that which was practiced in scientific

research itself. Design research and the philosophy of science broadly parallel each other over this period. Both move from a concern with method in the 1960s through a critique of this in the 1970s to new foundations from the 1980s onwards, focusing on what designers and scientists actually do in practice rather than on what seems ideal in theory. As noted above, this saw design being seen as a discipline in its own right, with its own "designerly ways of knowing" (Cross, 1982). In the context of science there was a comparable turn towards the social and material agency of research practice, such as in the work of Andrew Pickering (1995) amongst others.

In this light, what appears to be a rupture between design and science during the 1970s is instead a close parallel. Indeed the key critiques advanced in each area—that of Rittel in design and that of Paul Feyerabend (1970, 1978/1982, 1975/1993) in science, who were colleagues at UC Berkeley while they were developing their ideas—have similar content. Science, like design, involves creating new ideas and understanding. The criteria and methods appropriate to these cannot therefore be defined in advance if science is to progress but will change as part of the process. Feyerabend's *reductio ad absurdum* argument against predefined methods concludes by showing that the only criteria that can be given in advance that will not inhibit scientific progress is that "anything goes", a phrase which also appears in Rittel and Webber (1973, p. 164), while Rittel (1972, p. 393) has "everything goes". Furthermore, Feyerabend's (1978/1982) comments that the proponents of scientific theory are out of touch with scientific practice echoes the situation in design where Design Methods had become an "academic game" divorced from practice (Jones, 1974/1984, p. 26), as well as with Glanville's (1999, p. 80) comments regarding the form of science applied to design, as noted above.

## THE CONTINUITY BETWEEN DESIGN RESEARCH AND CYBERNETICS

As well as these parallels, contemporary accounts of science as a form of forward looking search, such as those put forward by Pickering (1995, 2010) and which are anticipated by cybernetics, can also be read as applying to how designers work. Cybernetics, which Pickering (2010) explores in depth, has had longstanding connections to design, with, in particular, Ross Ashby lecturing at the Ulm School of Design (with Rittel) and being an influence on Christopher Alexander and Pask collaborating with architects Cedric Price and Nicholas Negroponte as well as teaching at the Architectural Association in London and writing on architecture (Pask, 1969).

More recently, Glanville (2007) has argued, drawing on Pask's (1976) Conversation Theory and the common characterisation of design as a conversation (such as by Schön, 1983/1991), that cybernetics and design are analogous to each other. This parallel is substantial, resting on the shared centrality in each of both circular, conversational processes and also the observer (designer) as an active participant, to the extent that Glanville (2007, p. 1178) argues that "cybernetics is the theory of design and design is the action of cybernetics". This analogy is reinforced by Pickering's (2010) analysis which has emphasised the performative nature of the work of Pask and others, who played out their ideas using physical, experimental devices in much the same way that designers explore ideas through modeling and drawing. Therefore, while design research continues to make reference *to* cybernetic ideas, we can also understand it as a contemporary variety *of* cybernetic research, whether the connections with cybernetics are made explicitly or not.

Given this continuity, it makes sense to consider design research in relation to recent discussions of second order science, which have drawn on cybernetics (Müller & Riegler, 2011). Practice based design research, an expanding and still somewhat contested research field, is built on the two "motivations" for second order science that Karl Müller and Alexander Riegler (2011, pp. 2-3) note: the inclusion of the observer, in the sense of reflective and collaborative practice, and that of self-reflexivity, where design is used to operate on and explore itself (similarly to the cybernetics of cybernetics). This connection is an important point of comparison for how second order science can be constituted as a research field, providing a possible example that is practice based and outward looking while also recalling the performative explorations of earlier cybernetics. For the field of design, this is suggestive of a relationship between design and science that is based in a mutual enquiry rather than in the application of one field to, or in service of, the other.

## ARCHITECTURE AS FACILITATING SECOND ORDER ENQUIRY

More speculatively, architecture can itself be thought of as, at least sometimes, facilitating a similar sort of enquiry in our experience of it as that in which designers and cyberneticians engage. In a weak sense this is quite common. Architecture makes our relationship with the world experienceable and so questionable. This is partly latent in the slow evolution of everyday situations in relation to natural conditions, as described for instance by Dalibor Vesely (2004), or in the different ways that a building mediates between us and our environment. There is also, more explicitly, a tradition within architecture where buildings have been used to situate us in relationship to a particular understanding of the world. While this has often tended towards being didactic, and so towards minimising the potential for reinterpretation, the spatialisation of ideas nevertheless allows them to become something we participate in and interact with, similar to the physical devices of Pask and others. For instance, the intensely moving experience of visiting a building such as the Pantheon in Rome can be thought of in terms of the two motivations of second order science noted above: firstly, what is special about it is inseparable from our experience of it (hence the inclusion of the observer); secondly, it is both a model of an aspect of the world and a contribution to that world (and so contains itself, self-reflexively).

There are also examples of architecture that, in a stronger sense, can be understood as cybernetic enquiries. The most significant of these is that of the unrealised Fun Palace project of Cedric Price and Joan Littlewood, developed during the 1960s and to which Pask also contributed. The Fun Palace was conceived as a "university of the streets" (Littlewood, 1964, p. 322) that blurred the boundaries between leisure and education and, within it, the sciences and the arts. The proposed architecture could be reconfigured, using an overhead gantry crane, in response to the requests and activities of its visitors, providing facilities for a multitude of programs, including ones that would emerge through the interactions it housed and which could therefore, in principle, not be predicated in advance.

Recent scholarship on the Fun Palace has explored its cybernetic aspects and Pask's role (Lobsinger, 2000; Mathews, 2005, 2006, 2007). This has tended to characterise cybernetics as a field of technical expertise that was applied to the project. In contrast to this, I propose understanding the Fun Palace in similar terms to Pask's various performative devices, such as Musicolour or the Colloquy of Mobiles, and so within the context of cybernetic exploration and research.

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While the Fun Palace has been thought of as a reprogrammable "virtual architecture" (Mathews, 2006), it can also be thought of as a non-trivial machine in that its past use would change its future operation as it, its users and its organisers all learnt, and so changed, as in Pask's account of conversation. Thus while the organisation of the Fun Palace was highly purposeful, there would be no fixed direction to conform to, other than the maintenance of a degree of variety conducive to continuing novelty. In this way the Fun Palace, if built, would have enabled a form of forward looking search, similar to Pickering's characterisation of cybernetics and science more generally, questioning received ideas regarding leisure, education and society and developing, not just applying, new ones. It is distinguishable in this regard from comparable projects of its era, such as Constant Nieuwenhuys's New Babylon and Renzo Piano and Richard Rogers' Centre Pompidou, in that it aimed not to just respond to or accommodate the needs and wishes of its users or curators but to engage them in mutual enquiry. In this way the Fun Palace, and also Price's later Generator project (1976 onwards) to which John and Julia Frazer brought the boredom idea from Pask's Musicolour installation (Furtado Cardoso Lopes, 2008), put forward an idea of architecture as operating as a second order enquiry both in terms of its participative engagement with its users and its self-reflexive enquiry as to its own purpose.

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