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THE SOMETIMES UNCOMFORTABLE MARRIAGES OF DESIGN AND RESEARCH

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Personal introduction

There are many possible arguments the author of a chapter on design research might make, other than the one I chose to make here. And I have no doubt that what I have written will not sit comfortably or properly, in the minds of some readers. I can imagine the instantly dismissive tone of a certain type of response, precisely the sort of response I am trying to argue against. None of this makes my account wrong: it merely makes it contentious. It may be seen as contentious in what it includes, but also, and perhaps more so, in what and who it does not mention. The difficulty in any attempt to provide a position – or a review – is to find a line and then to hang a convincing and interesting story on it. In finding that line, any author will accommodate many views, but inevitably not all, and will feature the work of some, but not most, authorities. A further difficulty is not to drown the narrative of the story in reference, while yet showing the story is justifiable. And it is also to make space to include your own view, as author, without overplaying it. The real test of a text like this is, I believe, whether the argument helps you (the reader, but the author also) better to understand, and to act better. This is a reader's judgement: like a placebo, the question is not what design research 'really' is, but how this account helps readers themselves understand and go forward.

Design

Generally, we do not learn all that much about the current use of words from their etymology, yet it is sometimes helpful and revealing to acknowledge origins.

The word design is full of ambiguity. It first came into English from the Italian (via French) around 1500, according to Côte-Real (2010), although the etymology goes back to Latin. Côte-Real gives two sources:

- *designare*, meaning to draw (hence the identification of designing with drawing)
- *designare*, meaning to designate

We should notice that both sources are verbs: that is, they are concerned with acting rather than the outcome of acting. As we will discover later, the slippage of the word design to be

treated as a noun as well as, and often in preference to, a verb has a considerable influence on the shape of design research.

It is not as though the English speaking world did not have design and designers before these modified Latin words were imported and compounded. Nor are words used in other Germanic European languages for a cognate activity consistent with English: the Dutch ‘vormgeving’ is literally ‘form giving’ while the German ‘Gestaltung’ also refers to ‘forming’, the making of a pattern or a whole. But it seems we did not use a special term to distinguish the activity we now call designing before 1500, except for musical designing (composing – which, to my mind, suggests the use of pre-defined units) and words relating to architecture. As for the word architect, its Ancient Greek origin is made up of two parts:

- arkhi-, meaning chief
- tektōn, meaning builder

Although architect refers to building (i.e. constructing), it does not necessarily refer to what we now call buildings. What is considered the first (western) book on design is by Marcus Vitruvius Pollio (born c. 80–70 BCE, died after c. 15 BCE, generally referred to as Vitruvius). He was the creator of the idealised Vitruvian man, famously drawn by Leonardo, and the author of what is still the best definition of architecture – as constituted of three equal parts: well-made, functional and delightful. His book was published around 15 BCE as “*De Architectura libri decem*” (Ten Books on Architecture), containing instructions on making Water Mills, Clocks, Town Planning, Temples, Civic Buildings and Aquaducts (amongst others). It was not limited to what we would nowadays think of as architecture or even building(s): and tektōn itself comes from the Greek word techné, meaning doing/making – from which we get our word and concept technology. Vitruvius’s book was, in effect, what we might think of as a design manual. I use the verb, design, to indicate what I hold is the activity central to all designers, including architects.

Design, as a subject in its own right, appears during the Industrial Revolution, usually dated in the UK (where it originated) between roughly 1760 and 1840. (Pye (1999) gives a good account, and the British Broadcasting Corporation’s 2009 TV series “The Genius of Design” is convincing.) The ability to produce, by machine, multiples of large and expensive objects greatly outside human skill and scale meant there was a need to be able to construct these objects in the mind, before committing machines (and their operators) to production. Early machines were already programmable: the Jacquard loom was programmed by punch cards later used in the early days of computer programming (when they were called Hollerith cards) and still used to control silk spinning and weaving machines in China. From this moment, we can distinguish industrial design from architecture – yet the centre of each discipline is, I would argue (in the absence of the verb to architect), the same; and the verb to design, describing this shared central act, is relevant to both fields and, I believe, to all designing.

Machines are tended by mechanics and engineers. Indeed, much of what Vitruvius described as architecture would now be thought of as (civil) engineering. In some schools, architects are trained as civil engineers, later adding design as a sort of top-up. This engineering approach is rather different to the approach of those who come from what in the UK we traditionally think of as a design education (see Archer, 2005) as I sketch in the next paragraph; an important difference when it comes to research that reflects back to early days of formal design education.

In the UK, until recently, art and design¹ education – as opposed to apprenticeship – was taught in vocational colleges such as those set up by William Morris and others. These colleges, often called Working Men’s Institutes, eventually became technical and art colleges and

polytechnics which, in the UK version, were to be colleges of further education based in the local community and concerned with vocational training. In contrast, universities were based in academic research. Engineers were generally taught at universities (though mechanics were taught at vocational schools). Architects were taught at either: though the University of Oxford still rejects architecture as a vocational, non-academic subject. Design was taught at vocational colleges and is still only slowly making inroads in many older universities. Thus, while design (except where married to engineering) and architecture are rejected as academic studies by the University of Oxford, Oxford Brookes University (with its origins in the Oxford School of Art) welcomes both. At Cambridge University, architecture is part of a Department of Art History and had no official taught studio component until about 1970. There is no design department, although the word design has crept into engineering as it has, for instance, at London's Imperial College.

This difference between universities and polytechnics was maintained in much of the British influenced world. In terms of research it has made an enormous difference. Until the recent change in which almost all colleges and polytechnics became universities, staff members at these institutes were solely teachers: research was not part of their job. All this has changed, but, as we shall see, the difference in origin is highlighted in approaches to design research.

Design was taught as a practice in colleges with no tradition in research. Engineering has been taught in an academic research culture at universities, with little interest in practice. This difference is crucial in design research.

Research

Many think the word research connotes searching and searching again (re-); and, indeed, research does generally involve this iterative and testing approach. But the origins of the word are different. Research comes, in the sixteenth century, from the French re-chercher (re-cherchier in the Old French form):

- re-, expressing intense force
- chercher, meaning to seek

So research normally means to seek, deeply, with intensity. What is sought is reliable, new knowledge.

Nowadays, research in general is often confused with the particular type of research we call scientific research. But research does not have to be, let alone be identified with, science (Archer, 1995). To start with, the current understanding of knowledge in the English speaking world does not accord either with local uses in other languages (a German speaker can happily ask a painter about his/her scientific research – they use two verbs for our one, to know – kennen and wissen) or with the usage at the time when what we now call University was born (starting with the University of Bologna in 1088), when the Latin word scientia (science) simply meant knowledge. The Greek word philosophy, meaning love of knowledge, was used for the divisions of knowledge mediaeval universities promoted. The precursor of what we nowadays call science was known as Natural Philosophy. The word scientist was not invented until the early mid-1800s, so Isaac Newton was not a scientist.

There is, thus, confusion: while practitioners of research are certainly interested in producing what we call knowledge through their practice, this knowledge does not have to be scientific in the Anglo-Saxon sense, developed through what we now call the scientific revolution. In English usage, the phrase 'scientific knowledge' is either an oxymoron, or a serious constraint!

What will help us is to remember that science, as knowledge, is far wider and older than knowledge gained through the pursuit of the activity we now call science.

We have long understood that there are different types of knowledge. Aristotle (384–322 BCE), in his *Nicomachean Ethics*, distinguishes several ways of knowing. Of particular concern here are ‘sophia’ and ‘phronesis’. I inevitably oversimplify, but, put roughly, sophia is theoretical knowledge, while phronesis, practical knowledge, is what sophia is based on and must refer back to. There is a type of phronetic knowledge that exists in, for instance, the hands in use – as with a highly skilled potter or physiotherapist. This knowledge cannot be explained or expounded but can be shown and learnt – an example of what design theorist Polanyi (1966, 1974) calls ‘The Tacit Dimension’. Compare the similarity in the theory/practice division between university and vocational college!

Modern science is generally dated to around the time of Isaac Newton (1642–1727), using Newton’s *Mechanics* as its ideal. In an exquisite account “The Simplification of Science and the Science of Simplification”,² Weinberg (2001) tells how Newton simplified the cosmological universe to develop his mechanical model, which included, amongst other things, gravity and the inverse square law. This sort of simplification to create the universal ideal is one of the great strengths of scientific theorising.

The success of science is due to many things, including its method. Scientific method is intended to provide knowledge that is and remains testable. In principle, this knowledge remains reliable for as long as it is not disproved, ideally being subject to continuous testing and retesting. Karl Popper’s description of this scientific ideal suggests the purpose of science is to disprove currently held knowledge, a process he names ‘Conjectures and Refutations’ (Popper, 1963). Scientific knowledge should be repeatable (similar experiments will produce similar results), consistent (it will not contain contradictions) and it will be complete (nothing that should be covered is left uncovered). As it happens, these are also the criteria at the heart of the unsuccessful quest of (meta-) mathematics to show that all knowledge is founded on mathematics. I have suggested that science, in general, may place more emphasis on repeatability than the other two criteria. I see repeatability as the criterion behind the exclusion of the observer, because observers will be different, thus providing different observations.

So important has method become that the scientific method is applied to groups of methods to check they are methodical, giving rise to the subject ‘Methodology’.

Science attempts to give us reliable (long-lived, but never absolute) descriptions and explanations of the world as we find it, and is remarkably successful and often very beautiful. Science is not what is, but a description of what is – as we observe it. It gives us no truths, but it gives us viable knowledge and, with that, ways of acting and predictions that are almost always right. However, it is not the only approach (consider history, for instance), nor is it (as Paul Feyerabend (1975) showed in *Against Method*) inherently better than other approaches, although, collectively, we forget all this, giving a spurious authority to science and scientists. This authority damages and belittles other ways of gaining knowledge, as well as, eventually, belittling science and scientists. Research is not a set of procedures and rules, but a way of acting. There are other ways of knowing, and there were ways of knowing before we had modern science. Not much is sillier than a scientist operating out of his/her area of competence, demanding that everything be treated through the scientific approach.

Design research

Background

In a sense, design cannot be separated from research. For many years I have argued that research is a particular, restricted form of design, in terms of both experiments carried out and the creation, assembly and integration of new knowledge within the range of the existing (Glanville, 1981, 1999, 2006). I do not believe it is either reasonable or practicable to try to trace a full history of design and design research which might go back to before the Ancient Greeks. Ignoring architecture, in modern times since the moment of recognition that there is a subject (what has become industrial design) as well as an activity, we might start from Taylor's (1919) work applying science to management, and Elton Mayo's (1975) examination of the relationship between productivity, the observer and environment at the Hawthorne Works (1924–32), in particular what is often referred to as the Hawthorne Effect (Landsberger, 1958). These examples show other fields being introduced as means by which to study and propose improvements to the subject, treating designing as material to be subjected to evaluation using the approaches of (alien) subjects, in these cases management and (environmental) psychology. In fact, design has been subject to historical treatment for a far longer time, and every designer has to carry out some sort of (often low level) exploration (research) for every project they undertake.

It is clear, however, that in the scientific and technological optimism (one might say arrogance) of the post World War II years, science was seen as the universal provider of answers to almost any question, and the authority of science and scientists was virtually unquestioned in the popular mind. This was explored by Jacob Bronowski (1956), and forms the rich backdrop to his 1973 TV epic, "The Ascent of Man". In this social environment, it was quickly noted that design was not scientific and did not have any proper (that is, scientific) theoretical base. Several attempts were made to correct what was seen as a flaw. One came out of the 1958 Oxford conference on Architectural Education which generated an agenda for architectural education still widely used to this day, splitting it into (design) science, on the one hand, and in the other context (studied through theory, laboratory and essay) brought together in the design studio, in which everything is shaken up to produce a synthesis-as-outcome through the act of designing.

Another was the rise of design methods, an attempt to reduce the arbitrary in designing, rationalising the activity so outcomes would be less wilful and more scientific (by what Tomas Maldonado called operational science, a systems-thinking approach which embodied both art and science). This movement, inspired by memories of the Bauhaus, was led through the Ulm School of Design in Germany (Ulm HfG, opened 1953 with Max Bill as rector, closed 1968), where many of the most distinguished designer thinkers of their generation worked, including Maldonado, Horst Rittel and L. Bruce Archer. Their influence was enormous, and persists. The Ulm approach continued, for example, through Archer's position at the Royal College of Art (RCA), London (and elsewhere) until Archer's Design Research Department was closed by the RCA's rector Jocelyn Stevens in 1984.³ The key notion was that design is an academic topic in its own right, and should be recognised as such; and that design research should satisfy scholarly, academic criteria using well-founded evidence applied through systematic analysis (Rinker, et al., 2011). However, some of the early enthusiasts, including Rittel (with his over-complex "Wicked Problem" – Rittel and Webber, 1973) and John Chris Jones (1992) who turned to chance processes and the random, are among the distinguished early leaders who came to reject the dominance of method, rationalisation and linear causality so present in early design research.

The recent world-wide movement to promote research in universities and to assess and evaluate it in a competitive funding environment means that the ideas and understandings developed at and from Ulm are often considered increasingly crucial to design, design research and design education, today – at least by some.

Two approaches

Above, I have suggested a division in how we understand design, which I have linked to the kinds of educational establishments in which we study. I pointed out that although this view is simplistic, engineers study to apply theory in (research-based) universities, while designers study in vocational schools which are more practice based and hands on.

While much of the research in design follows the scientific paradigm used in engineering, not all does.⁴ Recently, work originating in the practice of designing has begun to be recognised, often as a different type of research. This research does not lack key components of other research – such as rigour and publication, and their sub-activities, including testing, contextualising, use of method – but these components do not necessarily take the form we are used to from the scientific model (e.g. Glanville and van Schaik (2003), Koskinen, et al. (2011), van Schaik and Johnson (2012)), and are thus sometimes difficult for even the most learned and well-informed to spot, let alone appreciate. It may even be that learnedness and well-informedness, within one tradition, create this difficulty in another.

In this reading, research based in practice is more concerned with Aristotle's phronesis than sophia, and connects to the vocational rather than the academic mode of learning and of making and transmitting knowledge. It is necessary and important, because it is based in and responds to what designers do, that is, the act of designing. I shall refer to this variety of design research as (designing) design research (in contrast to (engineering) design research). Surprisingly little research has been done into how designers design, and what their experience of designing is, in part because it is terribly hard to do within a scientific framework for a number of reasons, including the need to interfere with the designer's behaviour as (s)he designs, in order to obtain their explanatory commentary (this sort of problem is familiar also in action research, amongst other approaches). Also significant are the vast time spans, complexity of relationships involved and variety of work locations and types that may change throughout the process of designing. However, some important work has been carried out, particularly that by Henrik Gedenryd (1998), who died shortly after presenting his research as a PhD, sadly losing the chance to publish it more widely and accessibly. I surmise a further difficulty: that many scientists have trouble conceiving the possibility of and need for this sort of research. Cross (2006, 2011) throws valuable light on this.

Much of the research done within the (engineering) design research framework explores explanatory theories and theorisation, or the assessment of the performance of designed objects (i.e. the artefacts that are outcomes of design actions). The focus is almost entirely on the artefact (whether the artefact is a physical item or, for instance, a process). Observed behaviours are considered properties of such artefacts. Unfortunately, this sort of result is rarely helpful to the designer, since:

- a) it tends to tell him/her that (s)he is wrong, without revealing how, effectively, to correct the error, and
- b) it considers the world as objective rather than constructive, whereas the designer is essentially changing the world, a necessarily constructive act.

One is left questioning the value of research which has no interest in helping practitioners in the field being researched in their practice, scarcely recognising the sort of world they occupy!

(Designing) and (engineering) design research are not the only approaches to research into design. Amongst others are those used in the humanities (using the term in the widest sense). As already noted, history has been used for centuries to critique design, supposedly making it easier for designers (and others) to understand. Other approaches, some new (e.g. cultural theory) and some old (e.g. philosophy) are also popular. In general, we may note that these theories tend to have been applied to design, without much concern for the nature of the subject of design itself, and with little interest in learning from the subject they are imposed on: a sort of academic colonialism. Often, the 'research question' in this sort of work is not at all clear. In some cases, it is difficult to see what is held in common between a chosen subject's approach (or theory) and that to which it is applied, in which case the approach or theory cannot be an approach or theory of that area of application (Glanville (2005)) – though on occasion a mismatch can open up new and valuable possibilities, such as occurred with the application of deconstruction to architecture. So while (designing) and (engineering) design research are not the only approaches, they are the ones we will further explore here.

In its modern incarnation, the appreciation that practitioners have their own ways of learning and a particular species of knowledge is usually credited to Donald Schön, a professor of education and of planning at Massachusetts Institute of Technology (MIT), although, as Schön admitted, there is a long tradition that includes the work of the pragmatist philosopher John Dewey. Schön (1983) interviewed a handful of professionals from different fields and came to the conclusion that they learnt continuously to improve their performance by reflecting on what they did, modifying their actions as a consequence of their reflection. In Schön's sense, reflection means deep thinking, with a meditative edge. Schön argued that the type of knowledge professionals have, and their ways of creating new knowledge (by reflecting in action) was epistemologically valid, and that university based academic knowledge was not the only or, more importantly, the true way. In a certain respect, Schön's approach provides real-world support for Feyerabend's (1975) argument (q.v.) that there is no inherent superiority in the scientific account of the world, or the knowledge it generates. Schön (1985) also examined how architects work in the design studio, successfully arguing that their practice was in many ways superior to that used in a traditional university education, a finding reproduced on a larger scale by Geoffrey Broadbent and colleagues in South America (1997).

As I have already hinted, for a long time many have held (and indeed still hold) that there is only one way of doing research – the scientific way. I do not accept this, and trust I have established that there are also other ways (e.g. Glanville (1999), Jonas (2012), Koskinen et al. (2011)). In particular, there are two approaches that may be used in design research, reflecting two quite different approaches to knowing (sophia and phronesis), the ways we study design (in universities and in vocational colleges), and the position we take over the relation of theory and practice (understanding and acting). Let me add that I have come to the conclusion that to divide the world into, for instance, theory or practice, is a mistake. We should join the two together again as theory-and-practice – returning to Aristotle's interdependence. But if I have to vote for one, then I will vote with the minority – for the vocational, for practice and acting, and for phronesis – because I believe greater value in our research will come from helping designers designing: treating design as a verb rather than a noun. And because I value design as an alternative way of thinking to the scientific approach of problematisation, the (engineering) design research approach to research is of secondary interest. In this opinion I share a position with the growing number of 'through practice' PhD programmes that have been developed especially in Australia (van Schaik and Johnson (2012)), and more recently in the Nordic

countries, and at St Lucas (now the LUCA faculty of the Catholic University of Leuven) in Belgium. This is not surprising: I played a significant part in the development of the pioneering programme at RMIT University, and brought RMIT and St Lucas together to help develop this approach in Europe.

Characterising (designing) and (engineering) design research in design

In this section I shall consider some contrasting concepts that can help us distinguish these two approaches to design research.

Vocational (non-academic) and academic (scientific)

We live in experience, not in explanations of experience, even though such explanations are both powerful and useful. That is why *phronesis* takes precedence, in Aristotle's world, over *sophia*. This is not to deny *sophia* its proper place, but rather to demand a proper place for *phronesis*. Designers do not describe the world as it is, but rather they change the world (no matter how tiny the change) by making new objects, services, processes, etc. It is important to keep in mind the different approaches: research in engineering based in description and explanation and research in design based in/through doing.

Some identify research with the academic. By definition, historically this has naturally excluded research in doing. But academic (and particularly scientific) research is not the only sort of research: to identify research with the academic/scientific is to put the cart before the horse, and to insist that the general is defined by the specific, which runs counter to the rules of logic.

The challenge is not to dismiss, but to construct another type of research as powerful as scientific research. This is, in itself, a problem of design. As mentioned, I have argued that all research is, first and foremost, a problem of design, and so should be thought of first as (designing) design research (Glanville (1999)). To have more than one way of researching – more than one way of thinking and of knowing – enriches human life. And if criteria are different, or differently met, then, given the legitimacy in hoping to have both, the art is to learn to recognise and bring the best from each to the other rather than excluding and rejecting one.

Practice and theory

One difference between practice and theory is that, in general, theory is created by an observer standing outside the system to describe it, while practice, being something done, necessarily involves the observer acting within (as part of) the system.

This connects to understandings such as Michael Polanyi's (1966) 'tacit'. Recall that Polanyi insisted there is a type of knowledge which cannot be put into words: it will slip through the (metaphorical) fingers of any attempt to do so! However, he did not believe this knowledge was uncommunicable: the potter teaches his/her student through their hands, beyond and outside the world of verbal language and formal logics. This type of knowledge, often knowledge associated with practice, is real and important (and communicable) but, not being representable in language, it joins Schön's reflective practice, lying outside the academic conventional.

I noted above that Aristotle, while suggesting that the knowledge belonging to *sophia* is superior to that belonging to *phronesis*, also insisted that *sophia* comes from *phronesis*, and returns to (inform) it: the relationship is circular. In our culture we tend to think of theory as

somehow superior, applied to practice in a (linear) power relation: theory instructs practice what to do. This is in contradiction to the way Aristotle understood the connection.

The research we carry out should, I maintain, be sensitive to which category, understanding (describing) or acting, it is intended to inform.⁵ The first originates in the desire to describe the world as is, the second in changing the world. This indicates different types of research, reflected in the difference between (engineering) and (designing) design research. There is a relation between the two. However, this should not be the power relation it so often is but a circular interrelationship of equality.

It has been claimed that research originating in, and concerned with, practice is not rigorous (as discussed in Archer (1995)). I reject this view, which I believe comes about from confusing rigour with the particular form in which rigour is cast. Probably the most thorough and demanding test of any research is to act on it and examine the consequences of that action. This is testing. My understanding of rigour lies in continuing to pursue the matter at hand (to continue questioning) until the questions run out: that is, not to stop when the going gets hard, but to persist and hence break through. Behind this understanding stands honesty, the fundamental quality that must be the base from and within which all research is carried out. There is no inherent reason practice is less rigorous than theory. It may be that some practitioners are lax. But lazy and deceitful scientists are also familiar, as are those who act simply as unquestioning technicians. The failing of individuals is not the failure of a field.

Knowledge for (assisting) and knowledge of (assessing)

In 1993, Christopher Frayling published *Research in Art and Design* (Frayling (1993)). The key move in his argument was to change prepositions. He referred to research for design, into design and through design. In so doing he helped us contextualise the word design as noun and verb, but also as something to be studied (subject), and a way of studying relevant to the something to be studied (approach).

Acting in the spirit of preposition switchers Herbert Read and Martin Ryle, Frayling showed us two things. First, that there are differences in what people think design research is, or could be. Second, that the small change of swapping a preposition can effect an enormous change in meaning. The device behind the second difference (change in preposition) was also used by my former colleague, Dutch social theorist Gerard de Zeeuw, discussing the difference between a model of what something is and a model for exploring – which designers have traditionally called a sketch model.⁶

I extended Zeeuw's model pair into knowledge giving knowledge of and knowledge for. The former approaches Aristotle's *sophia*, describing the world as we believe it is, the familiar knowledge of facts; the latter the knowledge of acting (including experimenting), of changing the world – Aristotle's *phronesis*. It may thus be characterised as knowledge helping us act. I have observed (both from personal experience and from the response of many professionals and students) that research which generates knowledge often constrains designers because, in essence, it tells us that we're wrong (in the sense that our decisions lead to something that does not work properly), without offering much guidance about what we should do to improve matters: it assesses, but it does not guide. Knowledge for enables us to act, and can never be the same as, or, perhaps, as exact as knowledge of. But it does help us improve and change: it supports designers. The criterion is not 'right', 'true' or 'best', but 'good enough'.

An example may help. Thirty-five years ago, when desktop computers were not yet even a novelty, calculations for the loss of heat were done by hand. To carry out the full calculations

for a modest house took about half a day, almost invariably producing a result that was unacceptable. The result told you little about what to do to get a good enough result. So the calculation was repeated, and repeated and repeated; or, all too often, just abandoned. I remember this from painful personal experience! The use, nowadays, of spreadsheet software with optimisation algorithms has turned this around and the knowledge is now usable by designers. We have knowledge for, shaped for designers to act with, rather than knowledge of what the situation would be.

Technology is often seen as a link between these two types of knowledge. Technology can be interpreted as, amongst other things, a way of turning knowledge of into knowledge for. But even at its best, this is indirect, requiring the help of others, lacking the directness that designers like.

The terms knowledge of and knowledge for are not the only possible terms. It has been argued, for instance, that there is a strong connection with Gibbons et al.'s (1994) notion of mode 1 and mode 2 investigation which leads to different types of knowledge (Verbeke and Glanville (2005)), and, according to more recent developments, what is called science 1 and 2 (Mueller (2009)). Of course, we should not forget the terms Aristotle gave us, *sophia* and *phronesis*. Yet I continue to like my terms because of their immediacy and simple directness.

Verb and noun

The last contrast we consider is the part of speech the word design is taken to be: i.e. verb or noun. Much of what is collected under this heading has already been at least partially covered, but co-ordinated assembly under this heading seems helpful.

In English, both verb and noun are possible. But they indicate very different concerns. To research design-as-noun is to be concerned with the outcome of a design process, and to somehow evaluate it. In other words, it is a matter of assessment: the aim is to examine the performance of some designed object (or process) against a set of chosen criteria.

In contrast, to research design-as-activity (designing) is much more ephemeral. Most designing happens over a long period, often in the back of the head and inconveniently away from the work site (drawing board/computer). To determine the steps made by observing a designer's behaviour all too often gives little, if any, understanding of the internal processes the designer goes through, especially those of which (s)he is less aware, and gives none of that which is not directly expressed as discrete, observable behaviour. On occasion, researchers try to overcome the difficulty by asking designers to work in a temporarily constrained situation and to describe what they do as they do it, but neither the time frame, nor the describing are normal parts of the act of designing, and so distortion is introduced by the experiment itself, meaning we are no longer examining what we meant to. The best way I know through which to understand what is involved in designing is to invite the designers themselves to reflect on their own designing after the event (on various and variable timetables, in Schön's manner).

And we should remember why we want to understand: in order to improve. This is research intended to give assistance.

It may seem to the reader that the former approach is simpler than the latter: that to examine design-as-noun is more straightforward than to examine design-as-verb, and the result is less subjective. However, (designing) design is an activity (a way of thinking and of being in the world) which is subjective, personal and experiential. It needs an agent to do it! I am reminded of the way that life has been examined in biology, where, bizarrely, living entities are killed in order to examine life. In contrast, how refreshingly powerful Varela, Maturana and Uribe's (1972) *Autopoiesis* is, which considers life as the process of continuing to live!

The sort of difference here, between artefact and action, is familiar in other fields, and has led to the development of powerful methods such as action research and grounded theory that may help such research. In making my arguments, I am certainly not dismissing ready-made methods out of hand. But I do insist we should be wary, checking any chosen method for appropriateness.

The purpose of assessment is, ultimately, improvement: that is, we assess a designed artefact (e.g. object or process) in order to confirm it is of adequate standard and if not, to raise it to that standard. But having knowledge of the artefact does not tell us how to improve it; and knowledge we cannot act with is useless in a world of actions. Too often, we lack a knowledge of how, rather than what, to do; yet this is the heart of designing. For this reason, if no other, research into design-as-verb must be fundamental in design research.

I repeat, Aristotle may have considered *sophia* as superior knowledge to *phronesis*. But he also reminded us that *sophia* is based on and comes from *phronesis*, and it returns there for its own validation: a theory that doesn't work in the universe of discourse to which it is applied is not a theory of that universe of discourse – which is only to restate the argument made above about the appropriateness of theory to practice.

Conclusion

I have argued that when we talk of design research we often talk of two different views of both design and research. One of these views has, Terry Love tells us, far greater academic presence (which does not grant it superiority): in fact, I have argued, it is more restricted than the other. Yet, each may have its place, and which one we choose to pursue should be determined by the nature of our interest and enquiry. Much of the positioning in design research has been a jousting for superiority, often even an attempt to exclude the view a particular author does not favour. I have come to the conclusion that this approach, while sometimes necessary in order to focus a particular piece of research, is generally silly. However, in taking my position, I can also be accused of being partisan.

We have learnt, in the sciences of ecology, that variety is crucial: we should not artificially reduce nature's variety. Thus, we are careful to guard and protect all the bugs, known and as yet unknown to man, in the Amazonian rain forest. Yet, when it comes to ways of thinking, we are less accommodating, more willing to argue that there is only one proper way of thinking, and therefore of doing research. If this chapter has one overriding point it is that this is not so: we should guard different ways of thinking, of conceiving, interacting with and examining (coming to know) the world, and we should value this variety while following our own paths. The composer Arnold Schönberg, who invented atonal and then serial (twelve tone) music, is reported to have stated something very similar about music: "There is much good music to be written in C Major. But not by me" (Newlin 1974).

Nevertheless, there are what Nigel Cross (2011) has called "designerly ways of thinking",⁷ and it is, I believe, these that we should look to enhance as the main aim of design research. One element in the designerly is delight. So perhaps we should return to our earliest (western) text on design, Vitruvius's "De Architectura libri decem". Vitruvius claimed architecture (remember, architecture was used in a more general sense than referring just to buildings, a manner more akin to how we use design nowadays) was constituted, he wrote, of three equal parts, "firmitas, utilitas, vensutas", which translate as well-constructed, functional, bringing delight. Of these, *firmitas* and *utilitas* are relatively straightforward, and are handled by both varieties of design research. But delight is not really considered in (engineering) design research – in my opinion a serious, even near fatal, omission. The modernist slogan attributed to Louis

Sullivan, that “form follows function”, can be seen as an optimistic and somewhat self-serving plea, that delight will arise automatically if only the functional aspects are properly handled. Sometimes it does, but sometimes it does not. And what does this slogan mean when we invent a new use for some artefact, when function follows form in the manner of Gibson’s (1986) concept of ‘affordance’?

Again, to whom should we aim to bring delight? To the world at large, to the immediate users and also to those who make it, the designers.

There is a trade-off here. We have enormous, I would hope persistently insurmountable, difficulty in defining delight so that it becomes a metric. When all is definable, to achieve the best may be a viable aspiration. When it is not, what we mean by the best is no longer so clear, and we have to aim, rather, for what is good enough. But there are hidden advantages in pursuing what is good enough: room for alternative suggestions, the possibility of continuous improvement, the idea that it is always possible to try again (in Samuel Beckett’s (1984) phrase “Try again. Fail again. Fail better” which, though never intended for design, provides me with my favourite definition). Gerard de Zeeuw (of models of and for), in discussing the solving of problems in society, talks of the need to replace the problem being solved with another to be solved because humans like to solve problems, so removing problems leaves a serious hole in our existence. This leaves design as a way of acting that invites continuing involvement, a sort of perpetual job creation programme. If we want to promote delight in design, we should perhaps choose a model for research that might lead to improvement in delight, carefully.

At the start of this chapter, I remarked that its purpose was not to be right, but to help the designer understand and improve. In this I reflect a central message I have been arguing. How might the chapter help? I hope it casts light on a major division in design research, in a manner that encourages a coming together rather than a continuing battle, and that it shows the value of practice and of rigorous research into, in and through practice. But I also hope it may provide the reader with some confidence where, after World War II, designers had little: design is an important way of thinking and acting, and we should have faith in its value, and in the value of our acting with it. If I have convinced you, the reader, of my views, or if you have found any clarity, or an excuse to think further, I take that, too, as a success.

Acknowledgements

In writing this chapter the editors have given me allowances and assistance way beyond the reasonable. I have also received very helpful comments from them, as well as my colleague in Innovation Design Engineering at the Royal College of Art, Ashley Hall, and (as always) my wife, Aartje Hulstein.

Notes

- 1 Other words closely associated with design are art and craft. I mention these because design has a secondary meaning that suggests something underhand. A crafty person may be very artful, with designs on something (or someone), as in Dickens’ “The Artful Dodger”. The words imply at least as much of the loveable rogue, as of the impeccably cool perfection of Jonny Ive!
- 2 Weinberg’s account was extracted from pp. 12–15 of the book *An Introduction to General Systems Thinking*, and presented as a freestanding article by George Klir in 1991.
- 3 RCA mythology gives several very different explanations for Stevens’ action.
- 4 Terry Love told me he carried out an informal survey of research outputs and found 80 per cent or more were (engineering) design research. He also asked others who had carried out similar surveys and found them in general agreement. Interestingly, these were not scientific surveys! However, they are strongly indicative.

- 5 This distinction was introduced, implicitly, in the early days of design research by Broadbent in his insistence on his maker categories. See Broadbent (1973).
- 6 Zeeuw introduced this distinction in seminars he held in the mid-1980s. In spite of repeated requests, I do not believe he has written or published this very powerful distinction. I have no idea why not.
- 7 See also Bryan Lawson's extensive work, for instance, Lawson (2006) *How Designers Think*.

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