Design Thinking: The Search for Innovation, Creativity & Change

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Innovation, Creativity and Change reside in Design Thinking methodology. Design thinking in turn deals with complex or wicked problems using a variable mix of scientific analysis and design intuition. Innovation is a keyword for business today - *'innovate or die'*, the argument being that markets have now become so volatile. Business needs to *Change* to meet new challenges, as new competitors appear with *Creative* or *Innovative* business models to disrupt markets. The questions thus raised in commerce - what are Innovation, Creativity and Change? What is the meaning of this terminology for business? Is there a difference between *Innovation* and *Creativity* and how does one recognise Innovation in the first place? Understanding *Change* may be more easily recognised and deciphered, but what is the relationship between each and does Innovation and/or Creativity lead to Change or is it the other way around?

The question I pose here is: Can a design thinking methodology and process lead to Innovation, Creativity and Change? Shove states that Rumford's experimental work in the 1800s on thermal efficiency, and in particular the fireplace, resulted in designs that enhanced the conditions of many for future generations (Shove, 2003, p. 26). What is described here by Shove are clear improvements using a form or some forms of design thinking to make an existing concept much more efficient. Whilst we can clearly see that 'change' has occurred in respect of efficiency through a process of design thinking, can this change also be seen as Innovation and Creativity?

Firstly, it is necessary to consider the various forms of thinking that may or may not assist the designer in the search for Innovation, Creativity and Change. To anticipate the future impact of the design thinking methodology and process, rather than simply assume that design thinking is the basic act of thinking when in a 'designer' mode.

Papanek describes various forms of thinking, including analytical thinking, judgemental thinking, routine thinking, and creative thinking (Papanek, 1984, pp. 152-161). For analytical thinking, he uses the example of the following thought—"how long will it take me to drive from here to there, assuming a heavy rainstorm and stopping for lunch on the way?" Judgemental thinking he sees as making a preferential judgement in relation to a question or a need, such as "which of these three steaks looks the rarest?" Routine thinking he describes as looking up an answer or doing a calculation, such as "given a specific temperature for the tempering of steel alloy, what is the thickness required to hold up a bridge?" Papanek believes routine thinking goes with the territory of being an engineer. Creative thinking (which I will define below) is generally seen as the jurisdiction of design and thus also considered to be design thinking; however as I will show further on, creative thinking is part of the process of design thinking, but it is important to understand that it is not wholly design thinking in itself.

According to Papanek, creative thinking occurs in three ways. The first is the sudden insight or spark of genius, while the second is finding a new solution—the discovery that comes to us in a dream—and Papanek believes that these first two occurrences are 'intuitive' (Papanek, 1984, pp. 172-185). That is, they come about in part due to our expertise and in part due to our brain continuing to process the information in the background, while we are resting or doing other

things. He sees the third mode as a systematic solution-directed search for a new way of doing things.

Design thinking methodology and process utilise all of these three modes of creative thinking and Papanek then continues to describe typical creative thinking methodologies that attempt to break down 'creative' mental blocks and includes the following: brainstorming, synectics, morphological analysis, sliding scales, bisociation, trisociation, bionics and biomechanics, and other ways of forcing new thinking patterns. The effectiveness or usefulness of creative thinking methodologies to force thinking out of logical linear patterns and to make connections where connections did not exist before to create a potential innovative direction is well understood in design.

I wish to highlight that creative thinking is a part of design thinking methodology and not the other way around. It should not be confused with or described as design thinking as such; it is no more than the process of creative thinking and a way of navigating blockages and other thought limitations to provide a wider and more comprehensive range of options. This does suggest, however, that creative thinking is well placed to investigate a range of potential long-term impacts that may result from the design of a product. Then use analytical, judgemental and routine thinking to test the validity to determine the optimum design concept.

Another aspect in the search for innovation, creativity and change is described by Shove, who states that some existing outcomes have created 'change' upon society by altering existing systems or have resulted in the 'creation' of totally new systems (Shove, 2003, p. 68 & 127). She explains how cars depend upon and generate co-requisite arrangements, including networks of roads, garages and petrol stations, driving skills, regulatory systems and laws. Such systems in turn produce and maintain societies that presume and rely upon higher levels of automobility.

Shove also explains how the emergence of the cotton industry effectively revolutionised both the practice of washing and the content and size of the laundry basket. Both of these examples provide an overall sense of how the car and cotton *changed* existing systems and spawned new ones. More importantly, could it also be reasoned that change occurs due to creative thinking and innovation or does the need for change generate creative thinking and innovation at any point in time? Again, Shove argues that key devices can and do shape the direction in which whole systems evolve, but at the same time questions whether it is possible to spot these critical turning points as they arise (Shove, 2003, p. 195). I would argue that this is possible however any design research for *change*

will need to use a design thinking methodology to identify these 'turning points' or critical milestones.

Why Design Thinking?

I believe that today's service-industry-led designers do not use design thinking to its full potential; they are, in fact, reactive decision-makers using judgement thinking, and, to some degree, using routine thinking and I would further argue that what is often regarded as design thinking is in fact just one variation of creative thinking. The argument is that designers believe they control and influence the outcome of a product design concept, including important environmental issues and product sustainability to varying degrees as their thought process moves from rough concepts towards a final outcome. Yet, any design concept is already heavily influenced by design's existing role as a service-based industry and the perceived 'need' of their client before the role of design is even considered or a design consultant approached.

In analysing contemporary design thinking and strategy, Liedtka defines what she sees as design thinking attributes as well as introducing those of strategic thinking to demonstrate the effectiveness of the design thought process (Liedtka, 2004, pp. 12-15). First, design thinking is 'synthetic', that is, whatever the disparate problem(s) to be solved, a coherent overall design will emerge. Second, design thinking is 'abductive', that is, its primary concern is with the process of visualising what might be, some desired future state, and thereby creating a blueprint for realising that intention. Third, design thinking is 'hypothesis-driven', that is, the 'primary aim is the design hypothesis', which is conjectural and, as such, cannot be tested directly. However, as successive loops of 'what if' and 'if then' questions are posed and explored, the hypothesis becomes more sophisticated and so the design unfolds. Fourth, design thinking is 'opportunistic', that is, as the above cycles iterate, the designer seeks new and emergent possibilities and sketching (or drawing) and modelling are important tools in this unfolding process. And fifth, design thinking is 'dialectical', that is, the designer lives at the intersection of often-conflicting demands, recognising the constraints of today's materials and the uncertainties that cannot be defined away, but at the same time envisioning tomorrow's possibilities, that is innovation, creativity and potential for change.

In probing Liedtka's analysis of design thinking, it can be reasoned that synthetic and dialectical do fall directly into design thinking; however, abductive, hypothesis-driven and opportunistic fall

into the area of creative thinking. This also tends to suggest that overall design thinking is more strategic, whereas creative thinking on the face of it is deliberately random and somewhat chaotic, but also needs to be if it is to carry out its function effectively (Liedtka 2004, pp. 14-15).

Liedtka also presents an analysis of strategic thinking from a contemporary viewpoint where the first, second and third types of design thinking and this analysis of strategic thinking are closely related and the fourth and fifth differ between design thinking and strategic thinking. According to her, strategic thinking is synthetic, in that it requires the ability to understand and integrate across levels, both horizontal and vertical and align strategies across those levels. Strategic thinking is abductive; it is future-focussed and inventive, that is potentially innovative and creative, allowing individuals to focus attention, and to concentrate for as long as it takes to achieve a goal. Strategic thinking is hypothesis-driven; in an environment of ever-increasing information availability and decreasing time to think, the ability to develop good hypotheses and test them effectively is critical. It could also be argued that this particular point highlights the limitation design faces in the existing traditional service industry role. Strategic thinking is dialectical; in the process of inventing the image of the future, the strategist must mediate the tension between constraint, contingency and possibility. And finally, strategic thinking is inquiring and, inevitably, value-driven because, according to Liedtka, any particular strategy is invented, rather than discovered; it is contestable and reflective of the values of those making the choice. This analysis by Liedtka also highlights how strategic thinking (within design thinking) as dialectical is able to invent images of the future (Liedtka 2004, pp. 14-15).

The contemporary understanding of design thinking coupled with strategic thinking as described by Liedtka demonstrates how design thinking in terms of research is different in its methodology or approach to that of other disciplines and sciences. In other words, the way in which the hypotheses and concepts are researched and developed is also a process that could be described as being extraverted or more wide-ranging, as opposed to what could be termed introverted or insular research. Insular research encompasses methodologies of humanities and science with the 'step by step' progression of logical academic rigor. The use of design methodology is only limited by its position and role in servicing industry within a service-industry model. In a path-finding role, design has the capability to be much more effective and proactive in addressing (1) issues of finite resource issues, and (2) what has been termed the ecological violence of today that impacts negatively upon tomorrow.

While most designers would believe that they positively influence a design and direct its development to achieve the best possible outcome at any point in time, in fact, their design thinking is inherently flawed from the outset. This is because, as I have shown in the past, the designer is essentially a compliant force bringing limited resistance within the boundaries already established by others in terms of perceived needs and problems. In other words, many important decisions, 'turning points' or critical milestones will have already been decided with absolutely no reference to or input from a designer. Unquestionably, most designers will endeavour to re-direct their client by moving the proposed design towards a more suitable and sustainable outcome, but even this is still framed within the needs and parameters established by others involved in the process from the outset.

While these parameters will be, by their very nature, narrow and limited, it is still possible for a designer to expand outwards beyond these pre-determined limitations in the search for better alternatives by re-writing the design brief in an effort to re-educate and re-direct the thinking of others. The claim is that designers do this automatically as part of the design process. However, in their service industry-led role, even this process is both tainted and limited by a preconceived notion of the problem at hand and the required commercial outcome that stems from this. This preconceived notion of the problem therefore is not the 'real' problem, but is in itself a perceived problem that distracts from the 'real' problem, effectively negating any 'real' design thinking.

Problem Perception & Reality

In Heidegger's What Is Called Thinking?, he refers to "the many sidedness that may expand to such proportions that the one-sidedness on which it is based no longer catches our eye" (Heidegger, 1968, pp. 32-34). And so it may be with the common understanding of design thinking that as designers strive to investigate multiple views of the perceived problem, they believe they are actually reviewing all possible options or scenarios, when in fact the focus is still one-sided. If this perceived problem itself is flawed then designers are only looking at part (or one side of the problem) and as demonstrated in an earlier part of this chapter, it is quite feasible that they have already focussed attention on the wrong problem to begin with.

Any problem or question will provide food for thought and therefore is considered as thinking; however, it is also necessary to remind ourselves that thinking needs to begin by challenging the

very nature of the perceived problem to determine what exactly is trying to be achieved. As a simple example, the perceived problem could be the need to travel from Australia to London, where it has already decided that the best or most cost effective solution is to fly and the only options to be considered are flight availability, time and cost. The designer may still investigate other alternatives and even present strong arguments in favour of each alternative put forward, including hot air balloon travel, ship/ferry, or car, drilling through the centre of the Earth, or space travel. Many of these options may appear nonsensical or impractical; however, the critical question here is why the client needs to travel to London in the first place. What is it that they need to achieve when they arrive there, and even question whether London is the most suitable destination/location. Once we understand the real problem and what the underlying expectation is, a completely different range of practical and feasible alternatives present themselves, such a telephone call, a letter, a courier, the internet. By fully understanding the very nature of the real problem to be addressed or the expected outcome we have made a *change*; this then provides food for thought, further or deeper forms of design thinking using *creativity* which may lead to *innovation*. As shown, many different creative thinking strategies abound, which redirect the human brain, to effectively shift thinking from one-track or multi-track thinking around a problem, and that for many, creative thinking will be simply seen as nothing more than the generation of ideas for two- and three-dimensional aesthetic visual concepts that are pleasing to the eye. This only trivialises both the outcome and the process of creative thought that should reside in the realm of new and highly original and innovative thought. The generation of incredulous or incredible ideas and rough concepts are those thoughts and ideas that have yet to be fully resolved and thereby made credible to the world at large.

Forty sees the role of designer as a paradox in the most extreme terms, and asks how can designers be said to be in command of what they do, but at the same time merely be the agents of ideology, with no more power to determine the outcome of their work than the ant or worker bee (Forty, 1986, p. 242)? Forty's view is clearly based upon the 'reactive' response of design as a service industry and it is the notion of this work that by changing the way in which designers think we move them into the role of path-finder. Thus it is that designers, I argue, will then be provided the power and the ability to determine both the outcome and the long-term impact of their work. However, in his work on design and sustainability, Ehrenfeld also puts forward the argument for design to follow a different path, claiming the creative act of designing brings forth something

from nothing (Ehrenfeld, 2008, p. 63). It underlies the practice of architects and industrial designers who leave people with inspiring, moving artefacts.

Ehrenfeld states that no designer brings their future visions into being by following their present GPS systems, while Shove et al. claim methods and techniques of what they see as user-centred design are often used to develop products that meet what are taken to be pre-existing needs (Shove, et al., 2007, p. 119). However, they also argue that this can be used to support design processes organised around the rather different view that value lies not in the object itself but in the relation between user and artefact.

The relationship between the conceptual artefact (designed product behaviour) and that of the potential user (consumer behaviour) has to be objectively considered and thought about from every possible viewpoint in the design methodology and process. Merleau-Ponty describes the experience of objective thought as seeing the next-door house from a certain angle, but it would be seen differently from the right bank of the Seine, or from the inside, or again from an aeroplane (Merleau-Ponty, 1962, p. 67). I agree with Merleau-Ponty that the house itself is none of these appearances. From the viewpoint of design, it has the potential to be all these appearances and more and it is here that design uses drawing, both the act and the final image, as part of the observation, research and thought process.

On the one hand, I have argued in the past that drawing as learning through observation could also be interpreted within classical Asian thinking where, as Hall & Ames state, 'The thrust of Confucius' attitude towards thinking was as "reflection informed by learning" (Hall & Ames, 1987, p. 49). The relevant Confucius quote is "Learn the way broadly, question it in detail, reflect on it carefully, distinguish it clearly, and act on it with earnestness." On the other hand, Mill states the Western view that logic is defined as the Science and the Art of reasoning; meaning by the former term, the analysis of the mental process that takes place whenever we reason, and by the latter, the rules grounded on that analysis, for conducting the process correctly (Robson 1963, p. 4). Within Confucian thinking, drawing is a key part of the design process using both these approaches to think and reason. Drawing provides an overview for the broad learning, but also allows for questioning in detail to distinguish it clearly and logically.

I would argue that design thinking successfully deals with 'inherently ill-defined' or 'wicked' problems and is concerned with things that primarily do not yet exist and how things ought to be,

where designers create the future using the technology from science. In contrast to this, science discovers the laws that govern today's reality and are concerned with how things are and explaining what is. The science of design is a study of mankind. Throughout my work, I have demonstrated that design research is a particular type of research that relies upon a practice-based immersion to test theory (Whiting, 2013). It is comparable with, but at the same time quite distinct from, research in the sciences or the humanities since it advances knowledge partly by means of a *scientific* design practice, but also the use of intuition borne out of design development and experience. It locates where the need for *change* exists, the critical turning points or milestones where the potential for innovation and creativity reside.

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