

THE GOOD, THE BAD, AND THE WICKED

CRITICAL THINKING ABOUT DESIGN THINKING

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1. INTRODUCTION

If there are wicked problems, there must also be good problems and also, perhaps, bad problems – those not quite so wicked. If there is such a thing as design thinking, there must also be other types of thinking. Is there a form of thinking that is used by designers that is different from other forms of thinking? Is it possible to design without thinking?

The phrase design thinking originally referred to how designers think, a way of thinking about complex (wicked) problems – problems that are poorly defined and intertwined with solutions, a definition suggested by Horst Rittel, a mathematician, design theorist, and university professor at the Ulm School of Design in Germany in the 1960s (Rittel, 1973) and later elaborated by Richard Buchanan (1992). Such thinking is routinely used by expert designers, artists, and craftsman. However, in recent years, the phrase has been hijacked by the likes of IDEO and Stanford University's design school (called d.school), to refer to a simple design process that can be easily taught to novices in a couple of days. Blogger Lee Vinsel compares the corporate spread of design thinking to the spread of an infectious disease, and suggests that design thinking as it is now taught in schools is “not about innovation in any meaningful sense; it is about commercialization – a package sold by consultants and universities.” (Vinsel, 2017). Natasha Jen, a partner at the design firm Pentagram, in her talk “Design Thinking is Bullshit,” complains that design thinking has become a meaningless buzzword and facetiously suggests that the complex process of design has been reduced to a single tool, the 3M Post-It note. She notes what is often missing is critical thought (Jen, 2017).



Figure 1. Design thinking has emerged as a commercialized technique for generating new innovative ideas by stakeholders rather than designers. The technique stresses participation, empathy, and early testing with low resolution prototypes.

Jon Kolko, more sympathetically, describes the current practice of design thinking as a “human-centred approach to innovation that draws from the designer’s toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success.” Empathy, the participation of users, and experimentation with low resolution prototypes are important aspects of design thinking. Unfortunately, he laments, there are now two paths of design that are diverging: practicing designers practicing design by making things and other people practicing design thinking. He stresses that making has a formal depth, and form has ties to aesthetics, history, meaning, and people. Design has become a cultural phenomenon, a lens for human experience, a means to humanize technology, while design thinking, as currently practiced, is designing without the rich skills of designers. Design thinking programs are characterized by 2-hour subject interviews, chaotic working sessions, a relentless pursuit of newness, a lack of craft skills, and positive thinking at the expense of critical thinking. In his paper “The Divisiveness of Design Thinking,” Kolko provides a decent summary of the various criticisms of design thinking: it oversimplifies a complex process; it trivializes the craft of making things; it reduces complex and

meaningful connections of people to a simple attitude called empathy; and has become a tool of consultancies and universities to sell more work. In spite of this, Kolko thinks that the current popularization of design thinking has helped designers. He writes that “designers have recognized impact and it’s not about styling. It’s strategic.” He claims we can get more meaningful work by stomaching the superficiality of design thinking and riding its wave of popularity.

I am not so sure.

The way design thinking is commonly presented is intellectually confusing on three levels. Firstly, it borrows heavily from the Scientific Method and would be more appropriately labelled “a” design method. Insisting on empathy as a step and the participation of users suggest that it is more specifically a human centred design method.

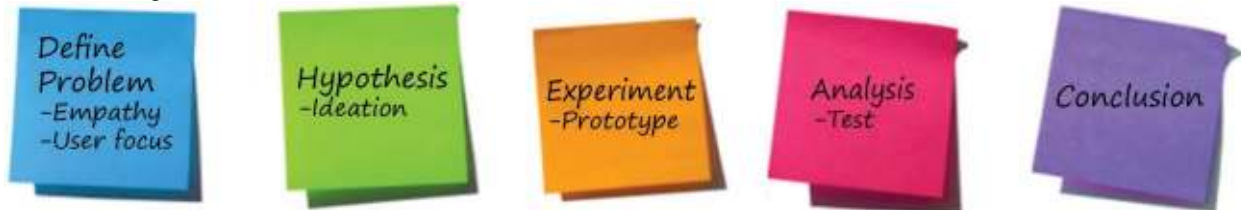


Figure 2. Design thinking as a method fits broadly into the format of the Scientific Method but requires certain steps such as empathy and user focus that are not required for all design methods. This suggests that the branded version of Design Thinking is really a human-centred design method.

Second, the method promises innovation as a result, with ideation – a non-critical generation of as many ideas as possible – as a central feature. This suggests that design thinking, as the phrase is used, is a technique, not unlike brainstorming. Third, design thinking, since it leads to a result at the end of a process, is indistinguishable from a design process. If the idea is to compress the design cycle, then a term like “sprint” as suggested by Jake Knapp as a five day process “to solve big problems and test new ideas” (Knapp 2016) would seem more appropriate.



Figure 3. Sprint is an intensive 5-day design process resulting in a prototype

Design thinking has been branded as a technique for generating ideas, not unlike brainstorming as a method for solving a design problem in a human-centred way, and as a tightly controlled collaborative design session more like a charrette. This suggests an idea that promises far more than it delivers, yet fails to define its true essence. The current commercialization of design thinking makes design in a formal sense less relevant and more commodified in the long run. Although frequently added to education curriculums, the watered down technique falls short of goals of early design theorists such as Bruce Archer, that design should stand equal to the humanities and the sciences (Archer, 1965).

The original purpose of the term design thinking was to understand and define the process of design in a theoretical sense, not as a separate activity that is almost the same as design but different. The use of the term now suggests that it is design-like thinking applied to problems not normally thought of as design problems. This is problematic in that it implies that other design problems do not require design thinking. The process of design thinking as presented by d.school is a caricature of a formal design process – it exaggerates empathy and user participation, while compressing idea generation and experimentation. Instead of being the way expert designers think, design thinking has become the way novice designers or non-designers design.

The way design thinking is currently used is quite different from the way early theorists used the term. In his 1973 paper "Dilemmas in a General Theory of Planning", Horst Rittel described the nature of wicked problems but never used the term "design thinking." Bruce Archer is credited with the first use of the term "design thinking," but the actual quote "Ways have to be found to incorporate knowledge of ergonomics, cybernetics, marketing, and management science into design thinking" suggests the thinking related to design rather than design thinking as an activity distinct from design (Archer 1965). Bryan Lawson discussed solution-focused problem solving approaches of designers in his book *How Designers Think* (Lawson 1980). In *Design Thinking: Understanding How Designers Think and Work*, Nigel Cross uses the term "design" and "design thinking" interchangeably suggesting that design thinking is how expert designers thought about a design problem and that this is integral to the design process. (Cross 2011).

Richard Buchanan writes in the introduction to his well-known article "Wicked Problems in Design Thinking," "Despite efforts to discover the foundations of design thinking in the fine arts, the natural sciences, or most recently, the social sciences, design eludes reduction and remains a surprisingly flexible activity." Here, the use of the phrase design thinking simply refers to thinking about design rather than as a separate type of activity. The phrase design thinking is used extensively in the article, sometimes to indicate how designers think while they are designing, and at other times to refer to the thinking about design issues or the profession of design.

Buchanan describes four areas of design to show how design extensively affects contemporary life: design of visual communication; design of material objects; design of activities and organized services; and design of complex systems. Only in the third does he add "better design thinking can contribute to achieving an organic flow of experience ..." Later, however, he reflects on the list as the "areas of design thinking." Buchanan appears to use the phrase design thinking as a means to show the expanding influence of design, not as an activity different from design. Design thinking is used as a general term for describing how design is practiced, a way of thinking about what design is, a means to differentiate the way a designer thinks about a problem from the way a scientist thinks about it, the effort of the designer to solve a wicked problem, and to a philosophy of how a product should be designed. He writes that industrial designers stress what is possible, engineers what is necessary, marketing what is contingent on the changing attitudes and preferences of users – each profession uses different arguments in their design thinking.

I propose that we abandon "design thinking" as an isolated (and branded) activity distinct from design. Design thinking can refer to thinking generally about design issues or to the way designers think when designing as opposed to other forms of thinking. Design thinking workshops should simply become design workshops or given some other name. The misuse of the phrase may never completely disappear, but I suspect the current backlash may ultimately discourage it.

Design thinking should also be distinguished from design method and design process. If design thinking is a unique form of thinking typically used by designers, it must be only one of a few different modes of thought and it must be possible to design without thinking. I will address both these possibilities in the remainder of this article.

2. DESIGN THINKING DEFINED

Design thinking as a phrase is useful to describe how designers think and how this type of thinking is different from other forms of thinking. It also distinguishes design as a purposeful activity to find a solution from a design emerging from a purely iterative and evolutionary activity. I suggest that design thinking should describe a unique way of thinking distinct from other forms of thinking.

Design thinking relates to the problem-solution interface, the attempt to find a solution to a "wicked" problem, which is a problem not clearly defined. Design thinking is used to discover a finite number of generalized solutions to a problem. Design is an act of creation that asserts a particular embodiment to one conceptual solution. Design thinking is a fundamental and very human way of thinking. It is used by anyone about to make something, plan a party, or organize a trip. However, to do it well requires a great

deal of skill and many years of experience. Design thinking typically accompanies design but design is an act of creation that does not necessarily involve any thinking.

3. SYMBOLIC VERSUS ANALOGUE THINKING

The human mind uses two distinct modes of thought, appropriately labelled by psychologist Daniel Kahneman as “fast thinking” and “slow thinking” (Kahneman 2011). Most people tend to use fast thinking to make decisions quickly with very little information or deliberation.

Design involves some fast thinking but is mainly slow thinking. The intuitive insight comes quickly but is then verified with a slow deliberate process of modelling and critical evaluation. Fast thinking utilizes simple heuristics. Decisions, made pre-consciously, are often wrong but with a better than chance probability of being right. This ability is critical in a dangerous situation where not acting could be disastrous. Design thinking should involve slow thinking apparatus that serves to critically evaluate proposed solutions, question the problem, and determine the solution space.

There is an important distinction between the way designers and the way everyone else, typically engage in slow thinking. I propose that design typically uses a form of slow thinking that utilizes analogy and iconic representations. The other mode of slow thinking I will call symbolic thinking. This is thinking, primarily with language and direct signification, with more symbolic representations.

Design thinking workshops typically engage fast thinking modes of participants, and notably, ideas are often presented symbolically as words (on post-it notes) rather than icons. Ironically, this suggests that much of what occurs in design thinking workshops is ordinary (symbolic) thinking, not real design thinking.

It is likely that iconic thinking came before symbolic thinking in our evolution and is a natural way to think, the thinking that occurs while dreaming. Communication regarding something new occurs by pointing out an analogy to something already understood. Design exploits this natural iconic thinking in order to discover new concepts that are beyond conventional experience, and conceives or constructs models that are a direct analogy to reality. More specifically, designers will often construct analogues such as sketches, models, and prototypes to describe and solve problems.

Symbolic thinking involves a combination of symbols – words or mathematical symbols that have agreed meanings. This form of thinking is fine for the solution of most problems and very efficient for transmitting information from one person to another. However, it is limiting when attempting to solve more complex or “wicked” problems. With symbolic thinking, symbols with previously agreed meanings are combined to consider options and to communicate. Iconic thinking is still required for new concepts or for ideas too subtle for the agreed upon symbology. Metaphoric thinking is found in artistic works including even literary works composed of language symbols. Design uses a form of metaphoric thinking that is more literal and solution focused.

It is possible to solve some design challenges with symbolic thinking. A conventional house, for example, can be designed by exclusively referring to plans of existing houses and incorporating the best features of each. Language can be used to approximate a design quickly. “Red, convertible, compact automobile” creates a more specific image in the mind than just “automobile,” but the technique is limiting if trying to design a new automobile.

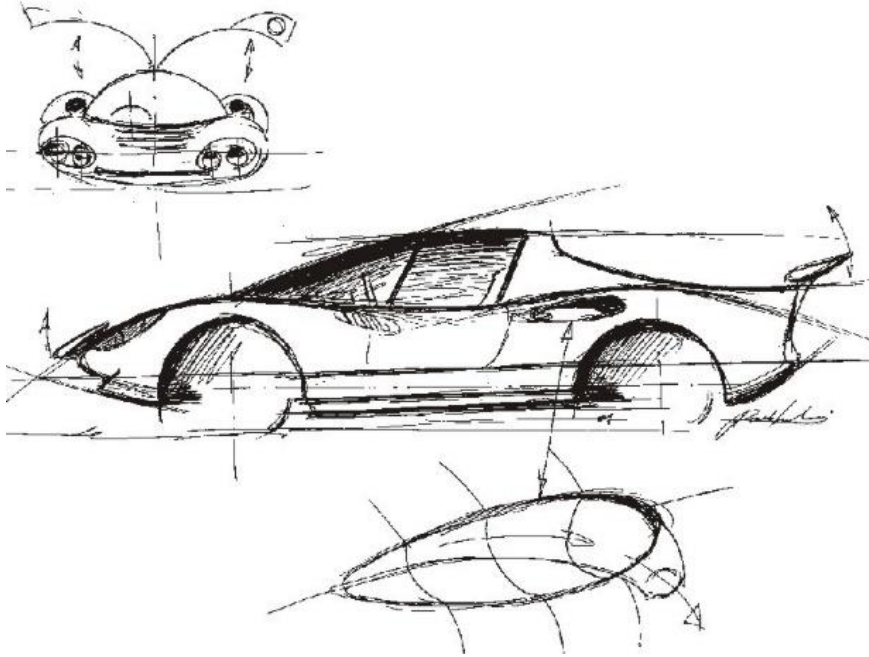


Figure 4. Draft sketch for Ferrari Dino Berlinetta competition Torusuzuki at Italian Wikipedia [GFDL (<http://www.gnu.org/copyleft/fdl.html>)]

Design is thus the use of icons including analogy, models, and prototypes. Instead of using reason, consensus, and past experience to solve problems, designers construct an analogous reality that is more subtly expressed, accessible, and modifiable in order to better understand the problem and to experiment with alternative solutions. Symbolic thinking is used to decide between alternative conventional design solutions and to present and prioritize ideas.

Human thought occurs with a string of associations, meaning through convention, metaphor, and analogy. Words appear to have unique meanings but really the meaning of each word changes subtly with context and a string of these meanings create an even more subtle inference that a computer program struggles to interpret. Symbolic thinking, or the use of language for thinking, results in an instant answer to a problem as it is based on an accepted meaning of the symbols. The use of language, which involves not only symbols with precisely denoted meanings, but also multiple connotations, can be used as a metaphorical means to represent reality in a more analogue way. There is thus a spectrum of possible thinking, from a purely symbolic (language without the use of metaphor) representation of reality, to direct analogue representations utilizing models and prototypes. In between is a metaphorical language that seeks a more particular and accurate representation. Design thinking is thinking analogously in order to solve a difficult and contextual problem. In contrast, symbolic thinking attempts to solve particular problems with generalizations and conventional agreements. The thinking tends to involve black and white choices rather than more subtle shades of grey.

There are thus three distinct categories of thought, well-articulated by Nigel Cross in "Designing Ways of Knowing" (Cross 1982): The sciences use symbolic languages, study the natural world, and learn techniques for controlled experiment, classification, and analysis. They value objectivity, rationality, neutrality, and are concerned with the truth. The humanities use metaphorical languages and study human experience. They have values of subjectivity, imagination, commitment, and a concern for justice. Designers use iconic languages, analogous modelling, and literal descriptions. Theirs is the study of the artificial world. They must learn techniques of modelling, pattern-formation, and synthesis. They value practicality, ingenuity, empathy, and have a concern for appropriateness. The language of design is modelling, which is equivalent to literacy in the humanities and numeracy in the sciences.

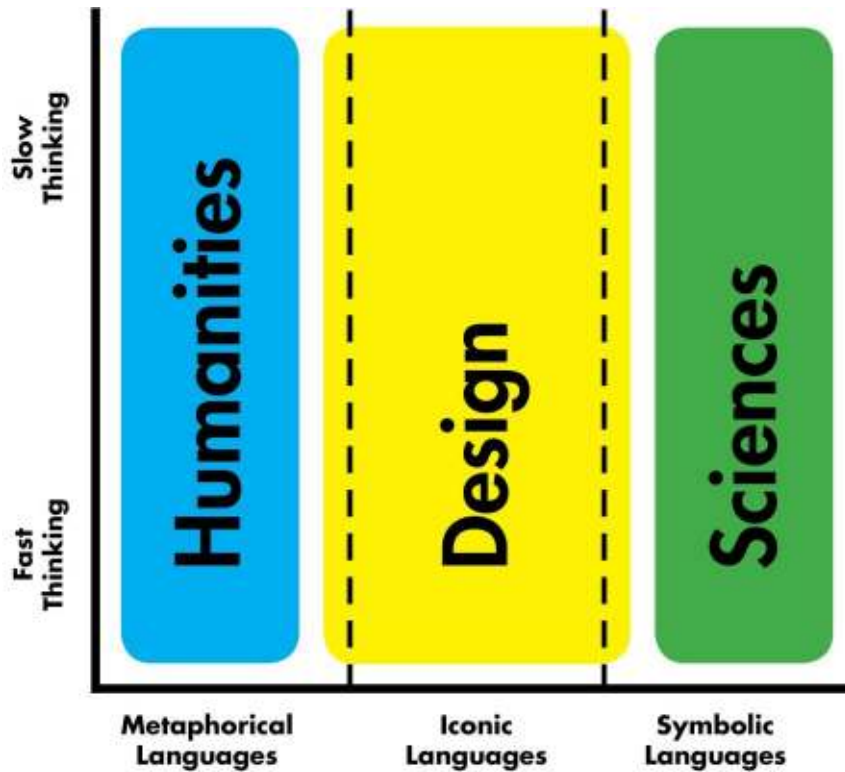


Figure 5. Design thinking is a combination of fast and slow thinking that primarily uses iconic languages

4. DESIGN BY THINKING VERSUS ARTIFICIAL INTELLIGENCE

Thinking involves a consciousness. So we can assume that computers, regardless of sophistication of programming, do not really think. Incredible advances have been made in Artificial Intelligence (AI). The defeat of the world champion Go player is a remarkable achievement. In order to accomplish this feat, however, the neural network had to be taught by viewing millions of games and then playing against itself for millions more. It would take a human brain several lifetimes to process this amount of information. So apparently, the brain is able to learn much more efficiently, and make decisions much more accurately, based on far less information available to it.

AI systems have a long way to go before achieving human-like intelligence (called Artificial General Intelligence or AGI). This is the ability to perform general intelligent action or the ability to think and experience consciousness. The current AI systems simply iterate endlessly, checking for solutions accurately and flawlessly. The advantage of human intelligence and perhaps the basis of consciousness is the ability to make decisions quickly based on little information.

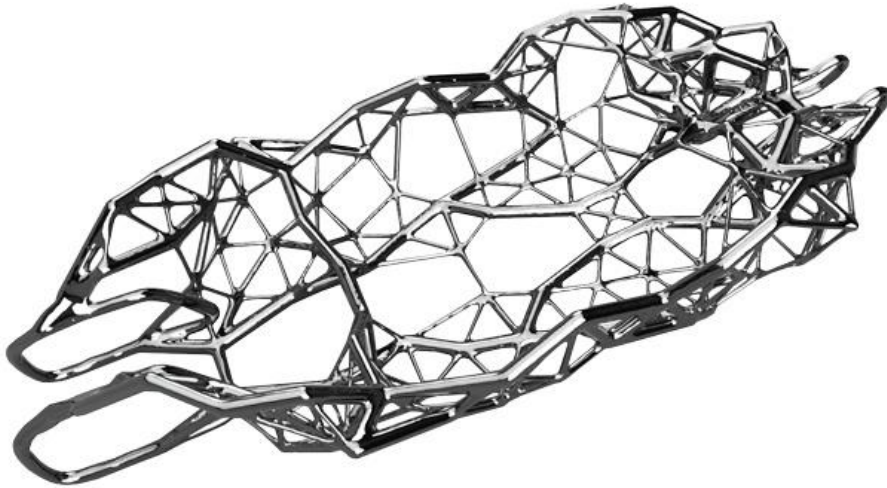


Figure 6. Hack-Rod AI generated race car frame. Image courtesy of Autodesk

Artificial Intelligence can be creative. Autodesk claims that its software has been used to create the first AI engineered racing car (Autodesk, 2017). Hack Rod and Autodesk took data from sensors attached to a custom car that measured strains and stresses. That data was then fed into Dreamcatcher, which created a new body design, which improved the vehicle's ability to withstand those stresses. However, it was a partnership of design thinking, artificial intelligence, and virtual reality that created the new design. Creativity is not limited to human intelligence but, so far, thinking is. Humans are required to decide what to make, how something should be made, and what technology should be used to aid in the design process. Computers can design but not think. The distinction between human intelligence and artificial intelligence is clarified by the distinction between design thinking and design.

For designers, I would place less emphasis on the worth of an uncritical iterative design process – “fail fast and iterate quickly.” The craft basis of design, in contrast to AI, suggests that there is a strong desire to succeed. Prototypes do fail and this is not a bad thing. Something is always learned and redesign always results in significant improvements. But multiple failure is not the goal as it is with evolutionary processes. Design thinking is used to narrow down the field and find the direction of success, not to iterate blindly. Artificial intelligence takes a random stab in the dark in a long process of elimination in order to eventually find the right solution. The algorithms of AI achieve success only with an inefficient process of trial and error. The inefficiency is hidden by a limitless capacity for memory and repetition.

5. THE DIFFERENCE BETWEEN THINKING DESIGN PROCESSES AND DESIGN WITHOUT THINKING

Design and making generally involve thinking. However, systems of artificial intelligence can design without thinking by embarking on limitless iterations that gradually converge on an optimum solution. Thinking is the mental process that occurs before doing and before making.

The problem-solution interface is the crux of what design is. Idea generation, on the other hand, can be based on a more mindless process like brainstorming, used to discover as many ideas as possible. Brainstorming is summarized as a formal process to generate as many ideas as possible without critical evaluation, in the hope that one of the ideas will be a good one. The premise is that a large quantity of ideas will include some high quality ideas and that many participants will generate more ideas. While, some scientific evidence suggests that individuals working on their own for an equivalent length of time will generate more good ideas (Chamorro-Premuzic 2015), brainstorming, if conducted correctly, with good facilitation, opportunity for individual thinking, as well as group participation, can be an efficient way of finding the good idea missed by other methods (Isaksen, 1998). From a design point of view, idea generation (ideation) is not the most difficult problem. There are a variety of techniques for generating ideas and if sufficient time is allowed for incubation, it can be assumed that all relevant ideas for a given

design problem will emerge. The difference between a good design and a bad design is usually determined more by the way the design problem is defined than by the number of ideas.

Design utilizes a form of thinking that designers use that is different from ordinary thinking. Design thinking involves the use of iconic representations or direct descriptions to describe and develop a different possible reality. It involves a literal translation of an imaginary reality and typically does not rely on symbols or metaphors. Design thinking is thinking critically and strategically about a problem in an effort to first determine the right problem to solve and second, to discover an exhaustive list of potential solutions. Designing occurs when the concept or solution is known. To design is to decide on a particular embodiment of a conceptual solution out of an infinite number of possibilities.

Design is a combination of divergent thinking – determining all the solutions to the design problem in a finite solution space and convergent thinking – determining the particular design of the design solution in an infinite solution space.

It is possible, using an AI approach, to design without thinking – design, using a purely iterative approach without much thought. The craftsman iterates; each completed version is an improvement over the last but by engaging intimately with the process in a critical way, the intention is to succeed, not to fail. Design thinking is the attempt to anticipate failure and to make modifications and adjustments before something is made. It ensures that design is a skill based craft rather than an unintelligent process.

A good problem is one where there is an obvious choice of solutions. Thinking – using symbols or language – involves political debate and deciding which solution is best. A bad problem is one that cannot be easily solved because of a lack of consensus even though the solution is obvious. A bad problem in the world is that despite many obvious solutions, decisions are still not being made. Symbolic thinking stalls on wicked problems and sometimes turns good problems into bad problems. Opinions swirl on social media but nothing happens. Action is blocked by constant disagreement.

Design thinking that uses iconic methods to go beyond the conventional can help to shift debate, to look at the problem from a different angle, and to suggest a new solution.

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