Technoetic Arts: A Journal of Speculative Research
Volume 8 Number 1
© 2010 Intellect Ltd Article. English language. doi: 10.1386/tear.8.1.31/1

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Evolving discourses on design thinking: how design cognition inspires meta-disciplinary creative collaboration

ABSTRACT

Originating within research on design cognition, the term 'design thinking' has been growing in popularity over the past three decades, and has become a matter in a variety of discourses, assuming diverse and not necessarily congruent notions. In this article we suggest how to differentiate those discourses on design thinking and discuss its evolution into a meta-disciplinary concept.

KEYWORDS

design thinking
design discourses
meta-discipline
creative collaboration
wicked problems
design cognition

In recent times, the term 'design thinking' has been invoked in various areas, thereby assuming diverse and not necessarily congruent notions. Originally used as an open concept to describe a designer's cognitive strategies of problem solving (Buchanan, 1995; Bousbaci, 2008; Cross, 1982; Lawson, 2006;

Nagai & Noguchi, 2003; Papantonopoulos, 2004; Rowe, 1987), design agencies such as IDEO and Frog Design now promote working methods thus labelled, advancing innovation in large-scale companies like Procter & Gamble or SAP with 'design thinking' approaches (Brown, 2008; Grots & Pratschke, 2009). Meanwhile, the concept of design thinking has also found its way into academic curricula well beyond traditional design programs, for example at the Rotman School of Management (Toronto) in the context of an MBA education and at the d.Schools in Stanford and Potsdam, which offer design thinking education intended specifically for non-designers (Dunne & Martin, 2006; Plattner et al., 2009).

As the term 'design thinking' is invoked in many different contexts, questions as to what kind of concepts are related to it and what purposes are linked to it appear time and again. In what follows, we address both questions by analysing the interrelations among design thinking discourses and outlining how their focal points have shifted over time.

DESCRIPTIVE–ANALYTICAL DESIGN THINKING: ASSESSING COGNITIVE STRATEGIES FACTUALLY DEPLOYED BY DESIGNERS

In the last 200 years, 'design' has evolved from a self-contained concept pointing to the development of products – from blueprint to embodiment – to an open and complex concept referring to the gateways between all domains of communicative and social action (Meier, 2001). Along with this development, the term 'design' suffers increasingly from an inflationary use, paralleled by diverging conceptions of design. Thus, the term has acquired striking ambiguities jeopardizing the precision that any scientific or other discourse demands.

Different schools of design research have tried to develop standardized theoretical frameworks. However, thus far all attempts to establish them across different schools and communities have failed. According to Cross (2007, p. 45), one can, nevertheless, differentiate between two groups of attempts: positivistic and constructivistic. Positivistic approaches look at factual design projects, trying to work out categories or category systems that help to organize design problems and processes. Constructivistic approaches, on the other hand, do not aim to describe a finite number of categories or dimensions on which to map design projects. In fact, they consider such an attempt as being 'beside the point'. Design challenges are construed as 'wicked problems' – a concept introduced by Rittel (1972). Often, design challenges are too complex and diffuse to be analysed on any fixed and finite set of dimensions (Buchanan, 1995; Lawson, 2006).

With research questions that are central to the constructivistic tradition as characterized above, Cross (1982; 1996; 2001) and Lawson (2006) have studied how designers factually approach problems and develop solutions, thus entertaining an empirical, descriptive approach. While the authors originally focused on domains such as architecture, urban planning and industrial design, their investigations have opened out into a broader discourse on cognitive strategies deployed to acquire, condensate and creatively transform pieces of knowledge within design processes (Nagai & Noguchi, 2003; Papantonopoulos, 2004; Rowe, 1987). Cross, Lawson and their colleagues face the challenge of observing, describing and analysing intuitive behaviours that designers themselves find difficult to describe. Nonetheless, recurring

strategies have been identified in the design process as empirically observed, such as the following:

1. Illumination of the problem space: In their exploration of a problem space, designers apply an intuitive (not fully verbalized) understanding, mainly by considering exemplary user cases or scenarios – as opposed to formulating general hypotheses or theories regarding the problem.
2. Illumination of the solution space: Designers explore equally a great number of alternative ideas; thus, their method matches the open and multidimensional character of the challenge itself.
3. Iterative alignment of spaces: In frequent iterations, ideas are transformed into tangible representatives (prototypes). These representatives facilitate communication not only within the design team, but also with users or employers. Thus, designers keep in touch with the problem-relevant environment.

While the first strategy creates anchor points in complex problem spaces, the second helps to be as exhaustive as possible in the exploration of the solution space. The third strategy enables a close and frequent exchange between the ideation sphere and reference groups of designers. All three strategies describe how designers link diverse fields of knowledge, which is often considered the crux of innovation, and, more generally, how designers tackle the complexity of 'wicked problems'.

NORMATIVE DESIGN THINKING: FORMULATION OF GUIDELINES FOR DESIGN PROJECTS

The results of the descriptive–analytical design thinking discourse – a description of what (successful) designers seem to be doing – also lend themselves to a normative interpretation. It is not only the case that designers factually proceed in this way and are successful. Rather, they are successful *because* they proceed in this way. If other groups also want to be successful in design, they *ought* to apply these same strategies. Thus, the strategies described above may be re-interpreted as design guidelines. This is precisely what happened, mainly in the 1990s and 2000s. Next to a descriptive outlook, a normative approach became more and more popular. In the same vein, pragmatic issues received more attention than they had before. Process proposals were being distributed and tried, concrete working methods were being devised and an attempt at teaching values was made (e.g., 'Encourage wild ideas!', 'Defer judgement!').

According to the normative approach, designers should adhere to the following guidelines:

- *Paraphrasing of design challenge*: The question or design task needs to be formulated and re-formulated until an assignment obtains, which is factually worth working on – even if that means shifting the subject matter.
- *Restriction-free thinking*: At first one should avoid (or ignore) personal judgements and only gradually develop shared judgements with other members of the design team.
- *An associative network of knowledge*: Designers should gather information from as many different sources as possible in order to consider as

many aspects as possible, and arrange their knowledge in an associative network.
- *Explorative generation of ideas*: Through a playful combination of personal experiences and project-related knowledge, ideas should be generated and refined until they adapt to the section of the world for which they are intended.
- *Multiple idea representations*: Ideas should be translated into different prototypes (e.g., visualization, mock-ups, models).
- *Conscious selection of solution paths*: Teams should use systematic and intuitive techniques to decide which issue will be pursued next, passing through two stages: (i) broad orientation and (ii) focusing on concrete aspects (of both the problem and its potential solutions).
- *Complementary team members*: Teams should be composed of members with diverse backgrounds and talents.

These strategies have been worked out in the descriptive–analytical tradition: they have been identified in factual design processes – except for the last point. The last point, rather, is an 'invention' of normative design theory, the idea being that no one individual alone knows all that there is to know (Brown, 2008). Rather, people have different talents; they know different things and are capable of doing different things. Thus, teams should be arranged in such a way that the members complement one another in terms of their academic training and talents. The diversity of talent and knowledge should be maximized or, more generally, teams should be able to move freely in a maximized domain of competence (Mittelstraß, 1987).

Maximized competence as a result of complementary team members has been promoted by the design agency IDEO, which was in many ways rooted in the activities of Stanford University's d-School. IDEO developed and commercialized their design thinking approach with great success. Indeed, they were so successful in applying their approach anywhere and everywhere that the concept of 'design thinking' has turned into an almost fashionable notion; the clarity of its meaning threatens to decrease as its range of application is steadily being increased. In fact, while IDEO still works in the domain of design proper, the concept of 'design thinking' has being exported into most heterogeneous fields by other advocates of the normative approach. For example, Charles Owen (2006) suggested 'design thinking' as a tool that helps to develop workable strategies in the fields of politics and management. David Dunne and Roger Martin (2006) introduced 'design thinking' as a complementary paradigm for MBA education. The *d-schools* at Stanford and Potsdam pursue a similar objective, as they offer training in design thinking to non-designers in particular (Noweski et al., 2009; Plattner et al., 2009).

This development is strongly connected to a dual trend in modern sciences. On the one hand, specialization is brought to an extreme; people excel in ever more minute fields of expertise. On the other hand, our interest in a 'big picture' endures. Given the increasing focus on details, mono-disciplinary work is less and less capable of meeting that demand. Thus, more and more multidisciplinary networks, cooperations or clusters are formed to overcome the split-ups. Yet, the attempt to break a domain down into distinct little building blocks (each of which may be handled by another expert for that particular piece) and to arrive at a consistent 'big picture' by adding up their individual results fails more often than not. In part, the problem seems to be that there is no investigation without rationale that

lacks a 'conceptual grid' according to which data are gathered and organized. Rationales, in turn, differ between disciplines, yielding incommensurable results. (For example, a physicist may consider a book and a bottle as equal insofar as their masses are equal. To a literary critic, books and bottles are completely different things, but two books may be equal despite one being a heavy hardcover and the other one a light paperback.) In multidisciplinary work, the plurality of professional perspectives alone obviously does not guarantee a coherent 'big picture' at the end. Rather, there is the danger of ending up with a huddle of distinct results. Some form of overarching communication is needed that helps team members in multi-professional projects to develop a mutual understanding in order to integrate what would otherwise remain splinters of knowledge.

DISCUSSION: DESIGN THINKING AS A META-DISCIPLINARY CONCEPT

Design thinking allows multi-professional teams to develop a mutual understanding due to its strong emphasis on team-based learning regarding both the problem and its potential solutions. It helps to extend mono-disciplinary rationales by offering a flexible *meta*-rationale, which counters the restriction of admissible questions or analytical schemes typical of mono-disciplinary thinking. Accordingly, the kinds of results that obtain at the end are not (or are less) predetermined by the academic training of the team members. Monodisciplinary, pre-established rationales are being replaced with strategies that help to develop a common ground of knowledge and agreement between disciplines. Thus, design thinking helps team members to momentarily disregard the 'drawers' in which they have internalized in their academic training – until a problem has been defined precisely enough for professional rationales and expert knowledge to be suitably applied.

Design thinking understood as a meta-disciplinary methodology loosens the link to design as a profession. Although design thinking was at first only explored and developed in connection with professional designers, strategies have been identified that are relevant to all disciplines and professions. As designers frequently have to handle gateways among different fields (e.g., they take an interest in the needs of people/users like social scientists but have to consider technical issues such as those for engineers), they have obviously developed certain policies to successfully merge differing professional outlooks. In the same vein, designers are capable of handling wicked problems. The strategies they apply may be transferred to many fields beyond design proper to help tackle wicked problems there. Thus, design thinking turns out to deliver a valuable methodology for interdisciplinary creative work as it specifically complements mono-disciplinary thinking. However, the particular exigencies of using design thinking as an overarching meta-disciplinary outlook have yet to be explored and investigated.

REFERENCES

Brown, T. (2008), 'Design thinking', in *Harvard Business Review*, June, pp. 84–92.

Buchanan, R. (1995), 'Wicked problems in design thinking', in V. Margolin, R. Buchanan (eds), *The Idea of Design*, Cambridge, MA (The MIT Press).

Cross, N. (1982), 'Designerly ways of knowing', in *Design Studies*, 3:4, pp. 221–227.

Cross, N. (2001), 'Achieving pleasure from purpose – the methods of Kenneth Grange, product designer', in *The Design Journal*, 2001, 4:1, pp. 48–58.
Cross, N. (2007), 'From a design science to a design discipline: understanding designerly ways of knowing and thinking', in R. Michel *Design Research Now – Essays and Selected Projects*. Basel (Birkhäuser), pp. 41–54.
Dunne, D. and Martin, R. (2006), 'Design thinking and how it will change management education: an interview and discussion', in *Academy of Management Learning and Education*, 5:4, pp. 512–523.
Grots, A. and Pratschke, M. (2009), 'Design thinking – Kreativität als Methode', *Marketing Review St.Gallen*, 2, pp. 18–23.
Lawson, B. (2006), *How Designers Think*, 4th ed., Oxford (Architectural Press).
Mittelstraß, J. (1987), 'Die Stunde der Interdisziplinarität', in J. Kocka (ed.), *Interdisziplinarität. Praxis-Herausforderung-Ideologie*, Frankfurt a.M. (Suhrkamp), pp. 152–158.
Nagai, Y. and Noguchi, I. (2003), 'An experimental study on the design thinking process started from difficult keywords: modelling the thinking process of creative design', *Journal of Engineering Design*, 14:4, pp. 429–437.
Noweski, C., Böckmann, O. and Meinel, C. (2009), 'Comprehensive design thinking solution for urban grocery shopping', *Proceedings of the International Conference on Engineering Design*, Stanford University, Stanford (forthcoming).
Meier, C. (2001): *Designtheorie – Beiträge zu einer Disziplin*, Frankfurt a.M. (Anabas).
Owen, C. (2006), 'Design thinking – notes on its nature and use', in *Design Research Quarterly*, 1:2, pp. 16–27.
Papantonopoulos, S. (2004), 'How system designers think: a study of design thinking in human factors engineering', in *Ergonomics*, 47:14, pp. 1528–1548.
Plattner, Hasso, Meinel, Christoph and Weinberg, Ulrich (2009), *Design Thinking*, München (Mi-Verlag).
Rittel, H. W. J. (1972), 'On the planning crisis – systems analysis of the first and second generation', in *Bedrifsøkonomen*, 8, pp. 390–396.
Rowe, P. G. (1987), *Design Thinking*, Cambridge (MA), London (The MIT Press).

SUGGESTED CITATION

Lindberg, T., Noweski, C. and Meinel, C. (2010), 'Evolving discourses on design thinking: how design cognition inspires meta-disciplinary creative collaboration', *Technoetic Arts: A Journal of Speculative Research* 8: 1, pp. 31–37, doi: 10.1386/tear.8.1.31/1

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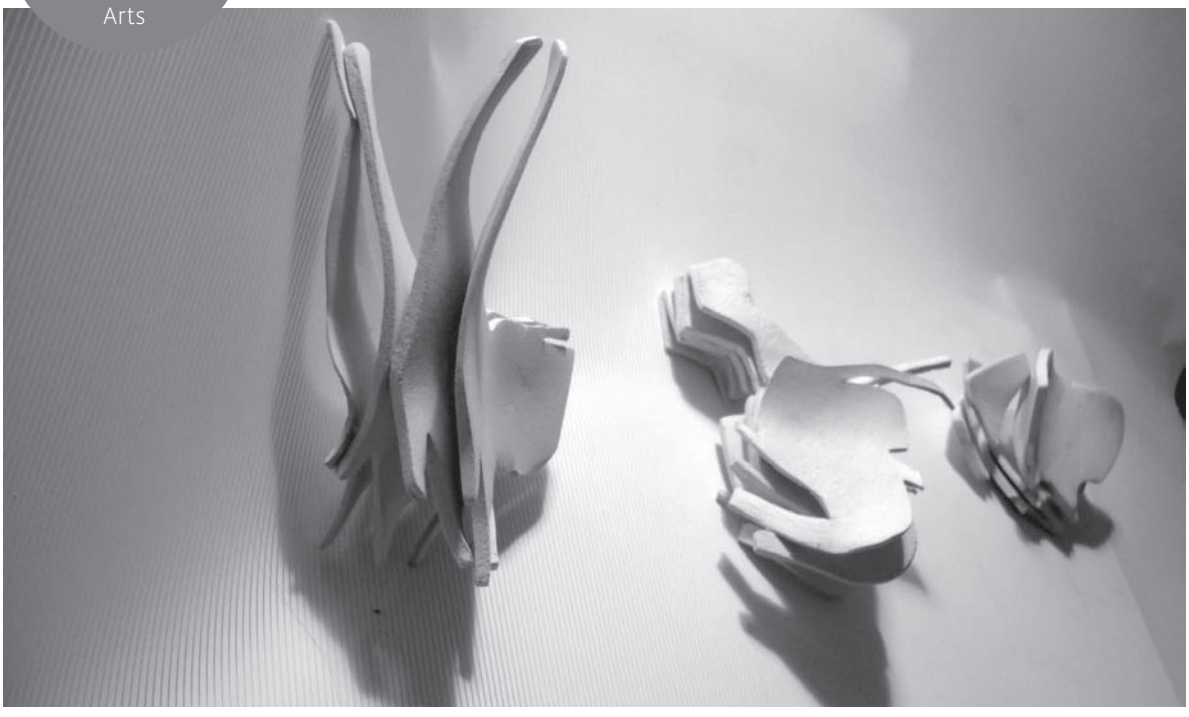

Design Ecologies

ISSN 2043-068X | Online ISSN 2043-0698
2 issues per volume | Volume 1, 2011

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Evolving discourses on design thinking: how design cognition inspires meta-disciplinary creative collaboration. Technoetic Arts: A Journal of Speculative Research, 8(1), 31â€“ 37. doi:10.1386/tear.8.1.31/1 Lecture 11 4. 5. Kimbell, L. (2011).Â Thirdly, descriptions of design thinking rest on sometimes contradictory views about the nature of design and, for all the claims about being â€œuser-centered,â€ still emphasize the designer as the main agent within design. Lecture 11 5. 6. The Future of Design Thinking in Australia: Barriers and Opportunities Design thinking is a conversation that should be brought to business leaders of Australian companies both large and small. Lawson, B. (2006) How Designers Think The Design Process Demystified, Architectural Press, Oxford. Lindberg, T., Noweski, C. and Meinel, C. (2010a) 'Evolving Discourses on Design Thinking â€” How Design Cognition Inspires Metadisciplinary Creative Collaboration', Technoethic Arts, 8(1), pp. 31-37. Lindberg, T., Gumienny, R., Jobst, B. and Meinel, C. (2010b) 'Is There a Need for a Design Thinking Process?', Proc.