Design practices in design thinking

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Abstract

Interest in design is growing among organization and management scholars, educators, practitioners and government bodies. Research often rests on Simon's (1969) distinction between design and the social sciences but it is not clear how this account of design relates to professional non-management design practice. Meanwhile some practitioners, scholars and educators claim that "design thinking", generalised across the work of professional designers, can and should be adopted by managers. These accounts often describe what designers do and say, focusing on individual action rather than situating such activity within a larger context in which different kinds of design professional go about designing and in which end-users play roles in constituting designs. The paper contributes to understanding of design within organizations by identifying weaknesses in descriptions of design thinking, drawing on theories of practice. It proposes an alternative way of conceiving of design activity, that does not privilege the work done by designers and that attends to the practices of other actors involved in constituting designs. Introducing a pair of concepts – design-as-practice and designs-in-practice – as an analytical device for discussing design solves a number of problems facing organization researchers and educators interested in design and helps deepen understanding of design.

Key words
Design, design theory, design practice, design thinking, practice, design science

Introduction

Interest in design is growing within management and organization studies and among educators. Recent journal special issues (eg Bate 2007; Jelinek et al. 2008), books (eg Boland and Collopy 2004; Martin 2009; Verganti 2009), conferences and conference tracks (EURAM 2009; EGOS 2010; Case Western Reserve 2010), and educational programs bringing design approaches to management education (eg Stanford 2009; Case Western Reserve 2009; Design London 2009; Rotman 2010) are evidence of organization scholars and educators engaging more deeply with the disciplines and professional domains in which practitioners refer to themselves as designers.

Outside of academia, too, design is highly visible. Study the TV listings, the non-fiction bestseller lists, or the magazine racks at the local newsagents, and one would be forgiven for thinking that self-conscious design has become a widely distributed set of practices, no longer the preserve of the design professional. We are invited to (re)design our homes, our menus and our identities as well as our gardens and cities. Design seems to have moved from being a specialized competence of professions in industrialized economies, to become something we can all do. The claim of architect Victor Papanek (1984), that everyone is a designer, has now taken on new vitality tied to particular kinds of consumption.

The starting point for many scholars within management and organisation studies is Herbert Simon's (1969) assertion that design is an activity undertaken by many professionals:

> Everyone designs who devises courses of action aimed at changing existing situations into preferred ones. … Schools of engineering, as well as schools of architecture, business, education, law, and medicine, are all centrally concerned with the process of design. (Simon 1969: 55-56)

Simon contrasted his view of design as concerned with the artificial, against the sciences, as concerned with the natural world. It has been particularly influential in computer science and in engineering design, leading to an influential characterization of design as a rational, problem-solving activity. This notion of design can be found in management and organization studies too. In strategy, for example, Mintzberg (1990) gave the name of "design school" to the approach that emphasizes the conscious activity of conceiving of strategic alternatives.

Simon's work has served as a resource for scholars and educators who have turned their attention to design in an attempt to refresh their own disciplines concerned with matters such as organization design (eg Romme 2003; Weick 2003; Boland and Collopy 2004; Yoo et al. 2006; Mohrman 2007), strategy (eg Liedtka 2000), and research design (van Aken 2005; Huff et al. 2006; Jelinek et al 2008). Taking forward Simon's idea that schools of business are concerned with design, scholars and educators have proposed that managers should adopt "design thinking" (Dunne and Martin 2006; Martin 2009) or take up a "design attitude" to complement a "decision attitude" that exists in management (Boland and Collopy 2004). Businesses should organize themselves like design teams (Dunne and Martin 2006) and think about the design of business, not just the design of products (Martin 2009).

But Simon's claims about design have begun to be reassessed. His characterization of design as problem-solving does not account for invention and novelty (Hatchuel 2001) and is seen as conflating several different kinds of design (Pandza and Thorpe 2010). Further, since it rests on an opposition to science, his view of design is not necessarily supported when either domain is viewed through the lens of science and technology studies which attends to the situated and contingent practices within knowledge production (eg Latour and Woolgar 1986). It is not clear to what extent Simon's view of design is adequate for describing the design activities in the work of professional designers such as architects (eg Yaneva 2005; Yoo et al. 2006; Ewenstein and Whyte 2009), or within particular organizational domains

such as new product development and innovation (eg Abecassis-Moedas 2006; Hatchuel, LeMasson and Weil 2006; Verganti 2009), service improvement and innovation (eg Bate and Robert 2007), or strategy (eg Ravasi and Lojacono 2005; Ravasi and Rindova 2008). Detailed studies of professional designers such as architects, product designers or graphic designers – from whom we might learn something about design – have been relatively rare. In recent special issue of *Organization Studies* on design science, while several papers proposed attending to pragmatism in design (eg Garud et al. 2008), few authors paid attention to the practices of professional designers.

This lack of understanding comes at a time when the term "design thinking" has emerged among some scholars, managers, designers and educators as a way to distinguish between the craft skills of designers, and a way of approaching problems supposedly common to designers that might be adopted by managers and applied to organizational issues. Presented as a way to balance organizational tensions between exploration and exploitation (eg Martin 2009) or as a loosely-structured organizational process to stimulate innovation (eg Brown 2009; Nussbaum 2009), recent accounts of design thinking do not draw extensively on organization and design research. But the idea of design thinking has gained legitimacy with several organizations including government bodies. In the UK, for example, the government-funded national Design Council, argues that design thinking plays a key role in innovation (Design Council 2009). In Denmark, a cross-ministerial innovation unit called MindLab combines design-centred thinking and social science approaches to create new solutions for society (Mindlab 2009). In popular culture, everyone might be a designer but in management practice, it seems, everyone should be a design thinker.

These discussions rarely make clear which design field is being referred to. Like Simon's generalized discussion of design, these claims about design thinking tend to blur differences between professional design fields. There are several professions and disciplines in which practitioners refer to themselves as designers and conceive of their work as design, rooted in three distinct educational traditions, which legitimize students and practitioners in different ways. For example, architecture and engineering have strong professional bodies and authorizing procedures, in contrast to design professions based in art schools in which product, communication, and fashion design, for example, are typically taught without the need for extensive professional accreditation and with limited domain-specific bodies of knowledge (Wang and Ilhan 2009). Engineering is often linked with formal theories of design, which fail to account for the generation of creative ideas (Hatchuel and Weil 2009) but engineering designers have an identifiable visual and material culture (Bucciarelli 1994; Henderson 1999). Emerging fields such as interaction design (eg Moggridge 2006) and service design (eg Kimbell 2009) often sit uncomfortably between existing academic institutional boundaries, concerned as they are, not just with the design of objects but also systems, processes and social arrangements. Discussions of design within management rarely attend to the ways that these discourses are produced through practices and institutions which are historically-situated and contingent. Further, accounts of design and design thinking often emphasize individual, rational action rather than the social contexts in which design activities take place.

In short, while Simon's vision of design has mobilized researchers and educators, it is not clear how it relates to professions such as product, engineering or graphic design and whether it makes sense, at all, to generalize about design across these fields, let alone whether such an approach is of value to managers and organizations. While not aiming to answer these questions directly, this article provides a new way of understanding design that will help researchers move beyond existing approaches, by conceiving of it as a kind of practice carried both by professional designers and by end-users and others whose doings and sayings co-constitute designs. Since descriptions of design and design thinking often rest on what professional designers do and say, it seems sensible to draw on theories of practice to analyse designers' routinised doings and sayings (Schatzki 2001). The main contribution is to propose

a new analytical device for discussing design based in theories of practice, which conceives of design activity as linking both what designers do and say, with what end-users and other stakeholders do and say, within particular socio-material arrangements. The paper's distinctive feature is to propose shifting the level of analysis in research into designing away from individuals to practices constituted by a nexus of minds, bodies, things, and the institutional arrangements within which designs are constituted (Reckwitz 2002).

The paper is organized as follows. First I present an abridged account of design research and the development of the term design thinking, drawing on key contributions that moved understanding of design from being concerned with designers' knowledge about objects and how to make them, towards knowledge about what people do with objects. Then I identify problems with these contributions drawing on sociology, science and technology studies, and organization studies, which assert the importance of situated, contingent practices rather than individual voluntarism. I then propose an alternative way of conceiving of design activity, that does not privilege the work done by designers, by attending to the practices of others involved in constituting designs. Introducing a pair of concepts – design-as-practice and designs-in-practice – solves a number of problems facing researchers analyzing design activity, which are illustrated in two examples. Influenced by sociomaterial accounts of organizations, I urge an approach to design that attends to the roles that artifacts play in design practices. The paper's contribution is to use theories of practice in order to advance understanding about designers' work and value creation within organizations, moving away from a disembodied, ahistorical design thinking to a situated, contingent set of practices carried by professional designers and those who engage with designs. The paper concludes with a discussion of theoretical and methodological implications for organization researchers and educators with an interest in design and designers.

Design and its objects

In contrast to much management and organization theory, within which attending to material artefacts is relatively new (eg Orlikowski and Scott 2008), for design, objects are central. As privileged makers of objects, professional designers in engineering, architecture and the arts are seen to have a special relation to knowing about the effects they might have and how they come to be. Alexander (1971) argued that design was about giving form, organization and order to physical things. For Alexander, "The ultimate object of design is form" (1971: 15) where form means a physical arrangement. Visitors to design studios are likely to note a disorderly arrangement of objects on work surfaces, walls and floors which remind us how professional design is still taken up with doing things with and to objects. Knowing how objects work, what they do, and how to make them, product and industrial designers are lay theorists whose ideas about human behaviour are inscribed in their sketches, models, plans and specifications and in the final design of an object to be produced.

Designers do not black-box the objects they arrange around themselves, study and try to change (Latour 1987). As Cross (2006: 9) puts it, "Objects are a form of knowledge about how to satisfy certain requirements, about how to perform certain tasks." As people who fiddle and tinker, who practice bricolage, they want to get inside and understand how objects are constituted and how they work. As Molotch (2003) suggests, "stuff" comes partly from designers doing things with other stuff. In the designer's world, objects and technologies are necessarily contingent; they don't have to be that way. Someone has designed them a particular way, for some reason. It may not be a good reason, but for designers, objects offer information about the purposes of their designers, manufacturers and users. "Designers are immersed in this material culture, and draw upon it as their primary source of their thinking. Designers have the ability both to 'read' and 'write' in this culture; they understand what messages objects communicate, and they can create new objects which embody new messages" (Cross 2006: 9).

Different design professions have found distinct ways to attend to objects and are expected to create different kinds of objects. For designers educated in the arts tradition, paying attention to the visual appearance of objects is a key part of the culture of designers (Julier 2008). Visual style matters, whatever that means for a particular set of circumstances at a particular time and place (eg Forty 1986; Sparke 2004). While other kinds of designer may be less attentive to visual effects or less skilled in creating them, the visuality and materiality of artifacts matters. For designers educated in the engineering tradition, the artifacts they create such as drawings and prototypes also play an important role in team collaboration, problem definition and solving, as Henderson (1999) shows. Objects are central to the work of professional designers, but theories of design have moved away from objects.

From design to design thinking

Writing contemporaneously with Alexander, Simon (1969) was also trying to understand and describe design. Having already made contributions to economics and organization theory, Herbert turned his attention to the organization – or in his terminology – "design" of human action in the realm of the artificial. In *The Sciences of the Artificial* (1969) Simon distinguishes design as the knowledge that is in the domain of the professions such as engineering, management or medicine, all of which he sees as concerned with "what ought to be" in contrast to the sciences which are concerned with "what is". In Simon's account of design, objects do not feature strongly. His view of design is as a rational set of procedures in response to a well-defined problem in which solving it involves decomposing systems (Simon 1962), searching for and choosing alternatives, and that this also worked for ill-defined problems (Simon 1973). Simon's assumption is that it is possible to determine a desired state of affairs and thus, he writes, "problem solving requires continual translation between the state and process descriptions of the same complex reality" (Simon 1969: 112). Simon's account of design may seem anathema to practitioners and theorists in less formalised design traditions which emphasize the impossibility of defining, in advance, a "desired state of affairs" once stakeholders are involved in defining and solving problems (eg Rittel and Webber 1973; Dorst and Dijkhuis 1995) or consider the aesthetic dimensions of design and changes in taste (eg Forty 1986). But his privileging of the formal work of the designer and other professionals offered a scaffold on which subsequent scholars have drawn.

A stream of research that developed from the 1960s focussed on what designers do and how they think. Sometimes called the "Design Methods" movement (Buchanan 1992; Jones 1992; Buchanan and Margolin 1995), these researchers sought to understand the processes and methods by which (successful) designers went about design activity especially in circumstances in which design problems were increasingly complex and Simon's "desired state of affairs" could not easily be defined in advance. Schön's (1983) description of individual, professional practices, focuses on the work by practitioners during their "reflection-in-action" as they move to reframe problems, based on judgement. Work by Rowe (1987), Cross (2006) and Lawson (1980/2006), for example, involved attempts to describe the thought processes of designers in action: their designerly way of knowing (Cross 2006) or design thinking (Rowe 1987).

Emerging from this tradition, Buchanan's (1992) paper "Wicked Problems in Design Thinking" shifted design theory away from its legacy in craft and industrial production towards a more generalized "design thinking" that could be applied to nearly anything, whether a tangible object or intangible system. Drawing on Pragmatist philosopher John Dewey, Buchanan saw design as a liberal art, uniquely well-placed to serve the needs of a technological culture in which many kinds of thing are designed, and human problems are complex. For Buchanan, design problems are indeterminate or wicked problems (Rittel 1972; Rittel and Webber 1973) to which the designer brings a unique way of looking at problems and finding solutions.

Buchanan's contribution was to shift the concept of design thinking away from a cognitive style toward an intellectual approach to problem framing and problem solving that acknowledged the social aspects of design work. More recently, theories of design have moved even further away from individual cognition towards an understanding of design that sees it as a distributed social accomplishment, acknowledging work in anthropology and sociology such as by Suchman (1987) and Hutchins (1995). For example Suchman (1987)'s description of situated action showed in detail how people using photocopiers went about purposeful activity that ignored the plans of designers. Suchman found that in practice, "Every course of action depends in essential ways upon its material and social circumstances" (Suchman 1987: 50). Margolin (1995) proposed that scholars of design shift attention from products to what he called the "product milieu" and pay more attention to the relations between design and social action. Krippendorff (2006) argued that design was about creating meaning. Within participatory design and the studies of computer-based systems, there has been a close attention to users' situated practices drawing on traditions within ethnography (eg Blomberg et al 1996; Kensing & Blomberg 1998; Squires & Byrne 2002). Combining consumption theory with studies of science and technology, Shove et al. (2007) argued that innovation in products often requires innovation in practices, calling for a "Practice Oriented Product Design" (cf Julier 2007). With an emphasis on the responsibility of designers to design for sustainable futures by designing in time, Fry (2009) argued that design professions should conceive of their work as a practice that attends to the effects of what is designed. To summarize, design researchers have moved over several decades from conceiving of giving form to artifacts, to problem solving, to a generalisable "design thinking" that can be applied to many different kinds of human activity, towards an attentiveness to practices, rather than individuals, including the practices of non-designers involved in shaping designs.

Design thinking moves beyond professional design

While the scholarly debate within design fields has shifted, the term design thinking remains current among practitioners, at a time when management and organization scholars and educators have begun to explore design as an intellectual and practical resource.

Boland & Collopy (2004) described their experience of working with architect Frank Gehry during the design of a new building for their business school. Drawing on Simon (1969), they distinguish between what they call a "design attitude" and a "decision attitude", finding the latter the basis of management practice and education in which the challenge facing managers is choosing between alternative options. They believe that "the design attitude toward problem solving, in contrast, assumes that it is difficult to design a good alternative, but once you have developed a truly great one, the decision about which alternative to select becomes trivial" (Boland and Collopy 2004: 4). For Boland and Collopy, the decision attitude and analytical techniques used by managers are useful for situations in which problems are stable, whereas a design attitude is necessary when feasible alternatives are not known. Both are necessary: managers are designers as well as decision-makers.

Similarly Martin (Dunne & Martin 2006; Martin 2009) also argues that design thinking offers something of value to managers, which can complement established analytical techniques. Martin (2009) sees design thinking as combining abductive, as well as inductive and deductive, reasoning and argues that managers are ill-served by contemporary management education which neglects the former. Drawing attention to the different ways that managers and designers judge reliability and validity, Martin (2005) points to some of the fundamental challenges facing those who would import designerly approaches to management.

Hatchuel (2001) has also explored the contribution that design can make to management and organization theory, arguing that design is essential to innovation and value creation. While acknowledging the importance of Simon's work on design within his programme of understanding "bounded rationality", Hatchuel argues that for Simon, design is a type of

problem-solving activity. Instead, for Hatchuel, problem-solving is a moment in a design process (Hatchuel 2001: 263). He shows that design – in the sense of creating new objects – requires expanding initial concepts, collective action and the creation of learning devices. Hatchuel's definition of design involves the exploration of non-countable sets which are infinitely expandable. This expandability of concepts underpins Hatchuel's formal theory of design (Hatchuel and Weil 2009) making it irreconcilable with earlier attempts rooted in bounded rationality (eg Simon 1969; Alexander 1964). In Hatchuel and Weil's (2009) C-K theory (concept-knowledge theory), an important element of design activity is what you cannot know.

In different ways, Martin, and Boland and Collopy have extended Simon's work and attempted to account for the distinctive practices of professional designers and describe why these are of value to management. In contrast Hatchuel has moved beyond Simon and away from a pragmatist approach to understanding design to generate a formal theory that offers an account of design which is nonetheless recognizable in accounts of practice. However there is not, as yet, any unified theory of design to serve as the basis for claims about designers' approaches and work practices. The next section goes on to summarize the characteristics associated with professional designers' work and design thinking, and where some of the contradictions lie.

Themes in design thinking and designers' activities

As the above discussion has shown, there is no single authoritative definition or description of professional design or design thinking. The list of characteristics summarized in Table 1, drawing on several contributions by researchers and practitioners, illustrates quite how diverse and at times contradictory ideas about the nature of design activity or design thinking are. As has been emphasized, theories and concepts about designers' work lie in several fields and are not necessarily consistent with one another. Research about design by scholars working within management and within design fields has seen understandings of design shift away from objects towards the processes, and from the individual to the social. The aim of producing the table is to highlight key themes that appear across these literatures.

Key discussions include the goals of design activity, whether generating forms to problem solving to expanding concepts and knowledge. A second theme is cognitive activity within design and whether during design there are particular modes of reasoning that are used. A third theme is the nature of design and design activity, which ranges from seeing design as fundamentally concerned with ill-structured problems, in which activities are exploratory and emergent, or as structured problem-solving. A fourth theme is concerned with the nature of professional designers, and their knowledge and skills, including seeing them as integrating and synthesizing, or generating new ideas. Finally, illustrating changes in professional designers' work practices, there are themes of co-design and collaboration and emblematic examples of designers' practices such as the use of visualization and attention to the aesthetic dimensions of organisations.

Table 1 Research on design and design thinking

	Characteristic	**Reference**
Goal of design	To achieve fit between a form and its context	Alexander 1971
	Problem solving	Simon 1969
	The generation of new concepts and new knowledge; expandable rationality	Hatchuel and Weil 2009, Hatchuel 2001
Modes of reasoning	Abductive	Cross 2006; Martin

and thinking in design		2009
	Inductive, deductive and abductive	Dunne and Martin 2006
	Balancing divergent and convergent thinking	Lawson 2006
	Designing new possibilities rather than selecting between alternatives	Boland and Collopy 2004
The nature of design	Determinate; ill-structured problems can be solved similarly to well-structured problems	Simon 1969; Simon 1973
	Indeterminate; design problems are wicked problems	Buchanan 1992
	Paradoxes between discourses; design problems are not knowable and evolve during the process	Dorst 2006
	A design attitude sees problems as opportunities for the invention of new alternatives	Boland and Collopy 2004
	Problem solving is a subset of innovative design	Hatchuel 2001
	Deterministic, path-dependent or path-creating	Pandza and Thorpe 2010
The nature of design processes and activity	Dynamic mapping between functions and design parameters	Braha and Reich 2003
	Selecting and identifying constraints and applying guidelines	Lawson 2006
	Exploratory and emergent	Cross 2006
	Functional decomposition	Simon 1962, Alexander 1971, Hubka 1982
	Reflection-in-action; making 'moves' to reframe problems	Schön 1983
	Design processes do not end	Lawson 2006
	Co-evolution of problem and solution	Dorst and Cross 2001
	Solution fixated	Cross 2006; Rowe 1987
	Experimentalism	Brown 2008
Designers' approach to knowledge production	Comfortable with ambiguity and uncertainty	Cross 2006, Michlewski 2008
	Integrating across knowledge domains	Hargadon and Sutton
	Consolidating multidimensional meanings	Michlewski 2008
	Empathy with users and stakeholders	Brown 2008; Dunne and Martin 2006; Michlewski 2008
	Design requires expanding concepts that are partly unknown	Hatchuel and Weil 2009
	Design requires designing learning devices	Hatchuel 2001
Emblematic practices	Sketching and drawing	Cross 2006; Lawson 2006
	Prototyping objects, experience prototyping	Kelley 2001, Fulton and Suri 2000
	Brainstorming	Sutton and Hargadon 1996, Kelley 2001
	Tearing up a drawing of a possible solution	Boland and Collopy 2004
Approach to organizing work	Collaboration	Brown 2008, Dunne and Martin 2006
	Co-design with users	Bate and Robert 2007
	Project-based working	Dunne and Martin

		2006
	Small group working	Kelley 2001

Design practices in design thinking

Having illustrated some of the key contributions to knowledge about professional design within management and design fields, I now identify some of the weaknesses and contradictions within this research. The discussion below is suggestive rather than conclusive but it raises questions for those mobilizing design or the term design thinking to make claims about the distinctive practices of design professions and their relevance to managing and organizing. To aid with this analysis, I draw on work in sociology, anthropology, and science and technology studies which attend to the situated, embodied practices of those doing (professional) work. Increasingly visible in organization and management studies, these resources offer a rich set of ways to understand the work of designers and the effects their work has.

Accounts of design thinking often hinge on descriptions of the ways designers *do* things. For example, in a striking story Boland and Collopy (2004) relate how, having spent two days with architects from Frank Gehry's firm revising the arrangement of space for their new building, the project architect Matt Fineout tears up the plans they have just agreed on and suggests they start again, now they know they can solve the problem (Cameron 2003: 92; Boland & Collopy 2004: 5). Even in this short description Boland and Collopy draw our attention to practice: what the designers do and say and how their activity startles the authors since it is not part of the routines within their professional work. While they identify a design "attitude", it is also possible to notice the embodied, shared experience of working around a table on sheets of onionskin, making marks and discussing how the building should be designed and how to design it, using the routines of architects. Reading this account, one can feel the authors' visceral response to seeing the architect tear up the work they have just achieved together and the spatial arrangement they had just agreed on. For this architect, design is not simply problem-solving since in this story, he tears up the solution that has been developed and agreed. This emblematic story may indeed serve to communicate the attitude of a professional architectural designer, but it can also be read as an account of design practice in which designers are willing to reframe problems and generate new ideas, even when an apparently viable way forward to an agreed problem has been agreed upon.

Theories of practice (eg Carlile 2005; Warde 2005; Reckwitz 2002; Schatzki et al 2001; Bourdieu 1990; Giddens 1984) draw on the attention paid in anthropology and sociology to what people do in their embodied, often mundane, situated interactions with other people and with things. Practice theory shifts the unit of analysis away from a micro level (individuals) or a macro one (organizations or groups and their norms) to an indeterminate level at a nexus of minds, bodies, objects, discourses, knowledge, structures/processes and agency, that together constitute practices which are carried by individuals (Reckwitz 2002). Examples of this perspective within organization studies include studying technology use (eg Orlikowski 2000; Barley and Kunda 2001;); strategizing (eg Whittington, 1996; Whittington, 2006); knowledge in organizations (eg Brown and Duguid 2001; Ewenstein and Whyte 2009); accounting (Hopwood and Miller 2004); product development (Carlile 2002) and service innovation (Dougherty 2004).

The variety of approaches within this theoretical orientation mean that practice perspectives are not necessarily coherent with one another (Carlile 2005; Reckwitz 2002). Practices involve bodies, minds, things, knowledge, discourse, structure/process and agency and, importantly, cannot be considered by taking one of these elements in isolation. This paper follows Reckwitz in his definition of an ideal-type of practice theory in which practice is understood as "a routinized type of behaviour which consists of several elements,

interconnected to one another: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge" (Reckwitz 2002: 249). For the purposes of this discussion of professional design and design thinking, three aspects of practice theory are emphasized.

The first highlights the way that situated and distributed practices constitute technologies and structures that have been designed (eg Suchman 1987; Hutchins 1995; Barley and Kunda 2001). In her study of Lotus Notes, for example, Orlikowski (2000) showed how technologies are constituted in different ways by users' practices. She found that as they interact with a technology in their ongoing practices, people enact structures which shape the emergent and situated use of that technology. She found that "technology-in-practice" can vary considerably in the ways structures are routinely encoded. "When people use a technology, they draw on the properties comprising the technological artifact, those provided by its constituent materiality, those inscribed by the designers, and those added on through previous interactions" (Orlikowski 2000: 410). The contribution of this study was to show that structures are not located in organizations, or in technology, but are enacted by users in practice. The implications for understanding design is that it transcends the boundaries of the individual and his or her cognitive style and offers a way to see design activity as distributed across a number of different people and artefacts.

The second aspect of practice theory on which I will draw is the attention paid to the role of objects in constituting practices, echoing work by many scholars attending to the material in studies of technology and organisation (eg Latour and Woolgar 1986; Latour 2005; Orlikowski and Scott 2008). As Reckwitz describes: "For practice theory, objects are necessary components of many practices – just as indispensable as bodily and mental activities. Carrying out a practice very often means using particular things in a certain way" (Reckwitz 2002: 252). Paying attention to objects, be they objects in the natural world, instruments, or objects produced within a knowledge practice is for Knorr Cetina (2001) a way of making a distinction between a definition of practice as rule-based routines or embodied skills, and a notion of practice that is "more dynamic, creative and constructive" (Knorr Cetina 2001: 187).

The third aspect of practice theory emphasized here, is knowledge. The particular contribution of the practice perspective is to avoid the alternatives presented in theories that focus exclusively on what goes on in people's minds, or at the level of social norms, or what goes on in language, for example. In theories of practice, knowledge is a social accomplishment situated in the ongoing routines of bodily and mental activities. As Schatzki (2001) explains:

> "The prioritization of practices over mind brings with it a transformed conception of knowledge. As indicated, knowledge (and truth) are no longer automatically self-transparent possessions of minds. Rather, knowledge and truth, including scientific versions, are mediated both by interactions between people and by arrangements in the world. Often, consequently, knowledge is no longer even the property of individuals, but instead a feature of groups, together with their material setups" (Schatzki 2001: 12).

In their discussion of knowledge in organizations, Brown and Duguid (2001) remind us that Polyani's (1966) terms "tacit" and "explicit", and Ryle's (1949) "know how" and "know that" are dimensions, not types, of knowledge. "They are interdependent and cannot be reduced to one another. … In both of these well known arguments, then, knowledge is two-dimensional and practice underpins its successful circulation." (Brown & Duguid 2001: 204)

Combining these three aspects of the practice-theoretical approach has something important to offer accounts of design and design thinking, which, as shown above, are typically accounts of practices rather than "thinking". Drawing on this approach problematizes such accounts in at least four ways.

First, the emphasis on individual designers in design thinking overly privileges the roles that design professionals play in constituting the meaning and effect of design outcomes. Several strands of design practice and theory have invested resources in articulating the importance of putting end-users and stakeholders at the heart of design (cf Rittel and Webber 1973; Norman 1988; Squires and Byrne 2002; Krippendorff 2006). In contemporary experience-based design practice (Bate and Robert 2007; Buxton 2008), designers study and learn from the experiences and practices of end-users and stakeholders as they begin to articulate design problems and start trying to solve them. In the field of participatory design, the designer's role is sometimes concerned with enabling conversations with stakeholders so that they can undertake design themselves (eg Kensing and Blomberg 1998; Sanders 2006). Calls for a user-centred or human-centred (Krippendorff 2006) design still foreground the designer as the creator of the design process, if they no longer create all the detail of design outcomes. But if we take seriously the contributions of anthropology and sociology to understanding what people do, especially once the formal design process is over and people are engaging with products and services *in situ*, then it becomes important to acknowledge the part that end-users and other stakeholders play in constituting the meaning and effects of design through practice (Shove et al 2007). Considered this way, end-users and other stakeholders are co-designers as they engage with objects in their practices.

Second, descriptions of design thinking that focus on individual designers and cognition fail to account for the situated nature of knowledge production and the institutions that serve to validate it. By looking at practices, rather than individuals or norms, scholars interested in design benefit from analysis that considers how knowledge that is required to practice becomes formalized, routinised or mundane; and how institutions take shape and authorize some kinds of knowledge, and not others, and some kinds of discourses, and not others (eg Foucault 1976). One way to understand the long-standing distinction between engineering-based design and design in the arts tradition (cf Dorst and Dijkhuis 1995) comes from considering how early engineering scholars went about formalizing and institutionalizing engineering design knowledge (cf Abbott 1988), in contrast to graphic, product or interaction design professions, for example, which have weaker institutions. Accounts of design thinking that are focussed on individuals neglect to account for the ways designers' knowledge becomes routinized, formalized and authorized within different institutional structures.

Third, the practice-theoretical orientation avoids difficulties associated with the word "thinking". The practice approach serves to emphasize the embodied nature of professional design work: how designers and stakeholders involved in design processes move, what they think, what they do and how it feels. In practice theory, routinized bodily performances and sets of mental activities are necessary components of practices (Reckwitz 2002). For a group of professions and disciplines that foregrounds stakeholder experiences, it makes sense to attend also to the experiences of designers whose practices and knowledge are intimately tied to what they do with their bodies as well as their minds.

Fourth, accounts of design activity typically involve descriptions of the artifacts that designers make, the sketches, models, photographs, videos, plans, specifications and other objects that designers make, acquire and use in different ways during design. "Drawing" is in the Latin root of the English word "design" (Borja de Mozota 2003). It is hard to think about design professionals without thinking about the emblematic artifacts with which they are associated, whether they are illustrations, models or prototypes. For example, it is difficult to imagine a product designer or architect without their drawings, whether created by pencil and paper or software tools. The concept "design thinking" with its suggestion of cognitive styles

neglects to account for the artifacts without which design practice cannot proceed and which constitute design. Ethnographic descriptions of engineering designers (Henderson 1999; Whyte et al 2008) and architects (Yaneva 2005; Ewenstein and Whyte 2008; Ewenstein and Whyte 2009) have shown how designers working within different traditions are entangled with objects, whether they have acquired them in the course of their work, created them, or involved stakeholders in generating them. In the practice-theoretical approach, artifacts are necessary constituents of practices.

Design-as-practice and designs-in-practice

Having identified problems within current accounts of design and design thinking, the paper now offers an alternative way of conceiving of design activity. The concepts I introduce solve these problems (although they may well introduce new ones). I believe the attempt to try to find a new way of thinking about professional design is pressing, at a time when educators, researchers and professionals within management and organization fields are increasingly mobilizing design in their work. I propose a pair of concepts as an analytical device, which draw on the literatures in sociology, science and technology studies as well as design studies. Using terminology from design, readers are invited to see this pair of concepts as a sketch. As such, the ideas that follow are understood as tentative, and suggestive, but nonetheless may offer important new ways to change how professional design is conceived of.

The first idea is perhaps an obvious move, to conceive of "design-as-practice". If descriptions of design thinking rely on accounts of what designers do, what goes on (as far as we know) in their minds, in their shared, embodied and situated routines, and cannot be completed without involving the artefacts they use, make and work with, how does it make sense not to use the resources offered by practice theory? Design-as-practice mobilizes a way of thinking about the work of designing that acknowledges that design practices are habitual, possibly rule-governed, often shared, routinized, conscious or unconscious, and that they are embodied and situated. Design-as-practice cannot conceive of designing (the verb) without the artefacts that are created and used by the bodies and minds of people doing design. This way of thinking of design sees it as a situated and distributed accomplishment in which a number of things, people, and their doings and sayings, are implicated. As with strategy-as-practice in organization studies (Whittington 1996), conceiving of design-as-practice offers rich resources for understanding what goes on during design activities and relating them to organizational outcomes. It moves the unit of analysis away from oppositions between individual skill or knowing (eg Martin 2009), or organizational competence (eg Kelley 2001) to an arena which acknowledges the practices and discourses which span both. Design-as-practice avoids the contradictory accounts of design that see it as a rational problem-solving activity (eg Simon 1969) or something concerned with expandable rationality (Hatchuel 2001). It acknowledges the work done by professional designers in their practices, but also opens up design to others, such as managers and employees in organizations, and also customers, end-users and others who through their practices also take part in design.

The second idea is "designs-in-practice". Like Orlikowski's (2000) technologies-in-practice, this term acknowledges the emergent nature of design outcomes as they are enacted in practice. Taking the plural noun form of "design" which can mean the outputs created during a process of designing, such as blueprints, models, specifications and what is finally assembled in products and services, the term designs-in-practice draws attention to the impossibility of there being a singular design. But it not sufficient to study what the designers and others involved in the designing process think and say and do. Drawing on consumption theory (eg Warde 2005; Ingram et al 2007) and ideas of user-led innovation (eg von Hippel 2001), the concept of designs-in-practice foregrounds the incomplete nature of the process and outcomes of designing (Garud et al 2008). When the designers have finished their work, and the engineers and manufacturers have finished theirs, and the marketers and retailers have finished theirs, and the customer or end-user has engaged with a product or service artefact,

the work of design is still not over. Through their engagement with a product or service over time and space, the user or stakeholder continues to be involved in constituting what the design is. Designs (the noun) are constituted through the practices of both professional designers, customers and identifiable, known end-users, but also by many others.

A brief illustration demonstrates how this analytical device might be used in empirically. It draws an ethnography conducted by the author during a study of professional service designers (Kimbell 2009). The aim of this research was to identify the ways that designers educated in the art school tradition approached designing for service, during a short project over several months in which a specialist service design consultancy undertook work for a science enterprise offering a service. The designers' goal was to help the organization redesign its existing smoking cessation support service, then being trialed in UK pharmacies, free to the person giving up smoking through the National Health Service. The service included genetic testing of the person trying to give up smoking, based on research that showed that genetic factors influence which nicotine replacement therapies are suitable for particular individuals. Two particular scenes from this research are described, in which the author was participant-observer and which were also filmed on video.

Designs-in-practice. One of the designers' first activities was a trip to a pharmacy where the smoking cessation service was being trialed. Accompanied by a manager from the service organization, the author and a cameraman, two designers visited the pharmacy in order to understand what the experience of the end-user was like (cf Bate and Robert 2007). While one designer made notes and sketches and took photographs, the other, a non-smoker, did a "walk-through" of the service going through various activities with a pharmacy assistant, in a similar way to how a user would first sign-up for the service. The pharmacy assistant took blood and saliva samples from the designer, telling him what she was doing and why, and how it fitted in with the service as a whole. The designers wanted to know how she found delivering the service as well as how would-be non-smokers engaged with her during the tests and sign-up activities. During this encounter, the designers paid considerable attention to the design of artifacts within the pharmacy connected with the service including a poster in the window, the layout of the small consulting room where the encounter took place, the website where the assistant signed up new service users and entered details, a large file of information about the service trial, and other things such as a hand-written thank-you note stuck on the wall.

One discussion revolved around the design of the test kit pack used to take samples of saliva and blood. The assistant explained how she found it useful to lay the contents of the kit out on the desk in a particular order. Since the time taken to do the saliva test and get a result was around twenty minutes, she had decided to do this activity first when meeting a new user trying to give up smoking. She laid out the kit in a particular way to prompt her to do this. The manager agreed there was a benefit to doing this, since reducing the duration of the encounter reduced costs and he noted that the pack did not include instructions on how to do this. The assistant had analyzed how she could use it to lead to more efficient delivery of the service. Her use of the kit configured it as a more efficient kit in practice than the ways other people might use it. The way she went about using the kit illustrated that, on its own, it was neither efficient or inefficient, but within the practices of pharmacy assistants delivering the service which involves doing saliva and blood tests, it could become efficient or inefficient. Thus the assistant's routinized practice played a role in constituting the design of the kit and the efficiency of the service.

Design-as-practice. Some days after the visit to the pharmacy, the designers spent several hours working together in their studio, observed by the author and filmed by a cameraman. On the wall they assembled photographs, prints from the web and other materials connected with the service to create a narrative representation of the customer journey from the perspective of the service user, a technique developed in services marketing (Bitner et al

2008). Overlaying this with annotated sticky notes, the two designers who had visited the pharmacy were joined by a colleague, and together they undertook a critique of the service. Their discussion ranged from considering specific "touchpoints", the name they gave to artifacts connected with the service, such as the poster in the pharmacy window, to the goals and strategy of the firm offering the service, the pharmacies involved in delivering it, and speculation about how smokers went about giving up smoking. This was an extensive although unstructured discussion drawing on tacit knowledge about what constitutes good design, with some references to other kinds of consumption and service. Using the consultancy's own templates, the designers sat around a table, working quietly as they each drew, occasionally making comments or showing each other their work. The designers moved from assembling a visual representation about what they knew about the service, centering on the experience of the person trying to give up smoking, to a critique of both the service (what it was offering smokers) and its individual touchpoints (eg how well a webpage was helping constitute that offering), to generating suggestions for improvements to touchpoints, suggesting new ones, or in some cases entirely new services. The activities of these three designers involved both explicit and tacit knowledge, minds and bodies working together, sometimes in silence, with little discussion about what they should do next but rather embodied routines which led them from one activity to another as they decided what to do.

This illustration has suggested how a pair of concepts, design-as-practice and designs-in-practice, might be used as an analytical device in research about design. While far from being fully-developed, this analysis suggests a fruitful way of trying to account for what goes on within design, through the practices of professional designers and others involved in constituting designs, such as the pharmacy assistant, with a particular focus on the objects that are involved in practices. As a relational pair, design-as-practice and designs-in-practice serve to ground the practices of designers, their knowledge, ways of knowing, ways of doing, and shared routines, within the bodies they use to do their work, their minds, and the institutional arrangements in which they practice, and connect them with the objects that are implicated in it, and, crucially, to the practices of stakeholders and others co-producing outcomes of design in the world, which are outcomes that must remain incomplete. As an alternative to design thinking, the pairing of design-as-practice and designs-in-practice moves the unit of analysis away from the individual designer or user, or the organization or group and its norms, to way of thinking about design that is relational, embodied, structured and structuring. The possible implications of this are now discussed.

Discussion

Earlier, theories of design and design thinking were discussed, in particular Simon's (1969) work with the attendant critiques of this formal, determinist view of design by Rittel (1972), Schön (1983), Suchman (1987), Hatchuel (2001), Pandza and Thorpe (2010) and others. For many management scholars, especially those drawing on anthropology and sociology, Simon's argument is unpersuasive since it fails to acknowledge the contingencies of the social within the sciences as well as design, and frames design within a paradigm of deterministic problem-solving. However *The Sciences of the Artificial* (Simon, 1969) marked out an important intellectual agenda that acknowledges the importance of designing which has been revisited in recent organization and management research.

It may be of value to go beyond the incommensurability of these two positions. Practice theory offers a way to do this. Simon's rational vision of design as the science of the artificial conflicts with social theories that serve to situate his ideas within the messy realities which most of us are familiar with as organizations and projects and in the ways that people engage with objects in their day-to-day lives. Practice theories offer an alternative by switching the unit of analysis from a choice between individual actors or society and its norms, to a messy, contingent, iterative combination of minds, things, bodies, structures, processes and agencies, and the configuring and reconfiguring of and between them. Attending to practice offers ways

to understanding the design activity not just as the work of design professionals but also of the managers, employees, paying customers, end-users and others whose doings and sayings constitute design, designing and its objects in different ways.

Implications and limitations

I now move to considering briefly what the implications of this discussion might be for management and design and limitations of this research. For management practice and research, there are theoretical and methodological implications. First, those mobilizing Simon's idea of design sciences as a resource for organization sciences might begin to question what is lost in Simon's account of design which is not necessarily reflective of what goes on in designers' practices. Second, the practice-orientation helps scholars and managers mobilizing design as a concept open up the roles that various actors play in constituting value-creation through design activity, which is already established within organization studies (eg Ravasi and Rindova 2008) but less so in some management disciplines. The practice-theoretical approach shifts attention to the practices involved during the design process, instead of focusing on the cognitive styles of individuals or teams of designers or other professionals or employees. Further, by foregrounding the work done by customers, end-users, stakeholders and other actors in constituting designs, once a product or service is in the marketplace or in society, this approach suggests that the activity of designing is never complete. Future actors may serve to change the nature of a design through their practices. Methodologically, this raises questions about research design, and what timescales are set within a study. At what point in time does it make sense to study a design and its effects? Which current and potential future users, customers and other stakeholders should be studied in order to understand a particular design? What other actors play roles in constituting practices?

For management and design practice, the practice-theoretical approach means that designers no longer have to make arguments about why stakeholders or end-users should be at the centre of design. In this approach, they already are. In the practice approach, design is understood to be relational and it cannot be conceived of without people and their practices. Further, stakeholders are co-designers and designers are another kind of stakeholder. Extending the view of practices as constituting designs through a nexus of minds, bodies, objects, structure, process, agency and knowledge challenges the "human-centred" claims of some designers (eg Brown 2009). Design practice may appear to be human-centred, since narratives about what people do with things in their day-to-day lives foreground human actors, but attending to designs-in-practice will begin to reveal the practices in which many kinds of actor are involved.

Finally, for educators introducing approaches, methods and tools from design fields within management education, the research presented here raises questions about the ease with which designers' methods and tools can be exported to MBA programmes. Practices associated with professional designers that involve visual and performative methods and attend to the aesthetic dimensions of organization life, for example, are part of an educational tradition in which challenging established categories is institutionally rewarded (Rancière 2004). In contrast, management education rooted in the social sciences and engineering knowledge may not welcome such approaches despite frequent claims that it should adapt (eg Huff and Huff 2001; Dunne and Martin 2006; Starkey and Tempest 2009).

The limitations of this study are several. Firstly, the discussion has drawn upon several literatures including design studies, a field that is young and rarely attended to within organization studies. While this eclectic approach is, I believe, appropriate for discussing design – a diverse set of professional fields – further work is needed in generating empirically-rich accounts of designing, especially studying professional designers educated

outside of management traditions and developing a vocabulary that either supports or replaces Simon's.

Second, while the concepts introduced here as a relational pair are suggestive, they are derived not from original empirical research but from existing work organization studies and hence they are embryonic. To what extent they serve to replace the term design thinking, or provide a basis for discussing design in organizations, requires further research.

Conclusion

In this article I have aimed to shift the conversation about a generalised design or design thinking to an approach based in the practices of professional designers and others. It began with the observation that design is of increasing interest to management and organization scholars and educators, with several existing programmes bringing design approaches to management education. It then reviewed key contributions to knowledge about design which identified a shift away from a focus on designers giving form to objects, to purposeful action to solve problems, to paying attention to the ways that design professionals go about their work and the roles played by end users in disrupting designers' intentions and constituting designs. The paper then reviewed the main developments in management and organisation studies using design, proposing that managing is designing as well as decision-making. Having summarised the literature about design and design thinking, the paper then identified a number of problems with the dominant view of professional design as rational action, rooted in theories that see the locus of the social not at the level of individuals and their minds, or in organisations and groups and their norms, but rather at a nexus of minds, bodies, things, institutions, knowledge and processes, structure and agency. The paper's contribution is to propose a new pair of concepts to describe and analyse design activity that acknowledge the work done by many actors in constituting designs in practice. As with other theories that attend to the production of the social as situated accomplishments in which the connections between things can be traced, the practice perspective is necessarily empirical. In order to see the connections between design-as-practice and designs-in-practice, researchers must go and look for them. This paper is therefore offered a sketch, which may contribute to the design of such a research programme.

Note

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