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# Metaphors in Design: How We Think of Design Expertise

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## Abstract

The notions of design and design expertise are often argued about, but rarely agreed upon, by the design community. Cognitive linguists suggest that metaphors structure our perceptions and understanding, and affect the way we organize our ideas. Based on this argument, the article investigates metaphors related to design, in particular design expertise, to address how these metaphors shape our understanding of design. It examines how design expertise is represented through the use of metaphors and explores the use of metaphors as a tool to recognize, share, and acquire expertise. Metaphors examined in this article are identified through a literature review on design knowledge and skills, and interviews conducted with designers. The metaphors are analysed in a framework that identifies the linguistic roots, associated meanings, underlying theories, and their possible impacts on the design discipline. This analysis contributes to the ongoing debate on design and design expertise. It also suggests ways of improving how we communicate design expertise with communities who often do not share the same language and mindset.

**Index Terms:** design expertise; design knowledge; design process; discourse metaphor; primary metaphor; generative metaphor; metaphor analysis; design repertoire

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## 1. Introduction

The studies of design expertise have focused on its nature and how it can be developed through a comparison between designers and non-designers (Christiaans & Dorst, 1992; Kavakli & Gero, 2002; Lawson 1979) and between novice designers and experienced designers (Akin, 1987; Cross, 1990; 1999). Christiaans and Dorst (1992), Ericsson (2001), and Lawson (1979) propose that expertise is not a skill that an individual is born with, but is acquired after years of experience, after hours of deliberate practice and study. An expert designer displays a special skill for

perceiving, formulating, and solving problems (Akin, 1987; Cross, 1990; 1999). According to Newell and Simon (1972) and Anderson (1983), the expert's conceptualization is beyond knowing more facts, rules, principles, guidelines, and examples when they solve problems.

This article explores design expertise through examining metaphors in design. Metaphors are not an ornamental aspect of language. They structure our perceptions and understanding (Gibbs, 2008; Lakoff & Johnson, 1980). “[T]he essence of a metaphor is understanding and experiencing one thing in terms of another” (Lakoff & Johnson, 1980, p. 5). Mapping metaphors in design and examining them may illustrate how design expertise is comprehended. The article discusses the possible implications of these metaphors for the design discourse and practice. However, it does not attempt to construct new metaphors for design expertise, but acknowledges new metaphors contribute to the richness of design and alter the way we think about design.

Zinken, Hellsten, and Nerlich (2008) introduce the term *discourse metaphors* as “a relatively stable metaphorical projection that functions as a key framing device within a particular discourse over a certain period of time” (p. 363). Examples of discourse metaphors are “[n]ature is a book” or “the state is a machine” (Zinken, Hellsten, & Nerlich, 2008, p. 363). Constructed by individuals, discourse metaphors differ from *primary metaphors*, which are widespread and well embedded in the language, in that the latter are hardly noticeable when used, such as *collecting*, *recalling*, *capturing*, and *building* expertise. Lakoff and Johnson (1980) indicate that metaphors are frequently used in everyday language and that people using them are rarely conscious of how they operate.

Metaphors used in the design field typically serve to generate new ideas, solve problems, and stimulate creativity (Casakin, 2007). Metaphorical expressions are explored in nonverbal domains through transferring a property of one domain to another. An iconic example is the ubiquitous “desktop” metaphor. Many physical elements in an office environment, such as files, folders, and wastebaskets, have been carried over to the construction of the digital interface to address how users interact with information. However, this article does not focus on mappings or three-dimensional appropriations of metaphors, but rather on how metaphors essentially shape the way we value things as a result of “seeing as.”

Metaphors in this article are understood through Schön's (1979) discussion of *generative metaphors* and implications of “seeing as” in the social policy context. Schön constructs the generative metaphor framework using two concrete examples. The first example is connected to the experts' opinion in the 1950s that the community would be healthy when a city had no blight or slum area—a slum was seen as a congenital disease that could be cured by it being removed and then replaced by new housing, parks, streets, and shopping centres. In the second example, Schön refers to Herbert Gans's Urban Village Project in 1962 through the metaphor of

seeing slums as natural communities. Gans recognized the informal networks of the slum with its homelike stability. Therefore, instead of dislocating people from their local areas and natural communities, ways of preserving and improving community cohesion were sought. Schön identifies that our strong affinity with the natural (due to its romantic origins) and our distrust in the artificial continue to influence our understanding of the topic. Seeing the slums as health/disease in the first example and nature/artifice in the second has different implications on how the reality is constructed, the problem is re-framed, and the solutions are found.

Borders (2011) presents a similar approach with regard to metaphors in economy: “One of the most pervasive false metaphors in economics is the economy as machine.” He demonstrates the metaphor through examples gathered from the publications in the economics, for example, “[h]ow to [f]ix the [e]conomy,” “how not to run an economy,” “the [e]conomy [is] [o]verheating.” He finds these statements problematic because they do not represent the way the economy operates. Economy is interdependent; one can neither fix the rainforest nor the economy by pushing a button. He suggests that understanding the “economy as an ecosystem” would be more helpful, although it is easier to think of economics by borrowing from Newton (physics) than from Darwin (biology) when discussing how to handle a crisis. However, daily doses of this kind of language add up over time, affecting our understanding of the way economies actually function.

Similar concerns are relevant to the design discourse. Cross (2011) discusses the design activity and thinking by means of two metaphors: (a) creative problem solving like the activity of an ant (Simon, 1969) and (b) designer as an explorer (Jones, 1992). However, how the design process or design expertise might itself be metaphorically conceptualized has been seldom addressed. This article questions whether there are any metaphors in design, which represent the expertise and the practice in a way we should not live by.

## **2. Method**

The method followed in this article can be considered a metaphor analysis, which is in essence a qualitative research method (Schmitt, 2005) and is based on the conceptual metaphor theory (Lakoff & Johnson, 1980). The procedure utilized in this analysis included four steps that are based on the works of Schmitt (2005) and Andriessen (2006).

The first step was to define design expertise as a target area for metaphor analysis. The second step was to sample a selection of text from the area of investigation. Following the literature review, the researcher identified a number of themes as key aspects of design expertise. These are design knowledge, design skills, design outcomes, design processes, and design roles. The data cover basic texts that discuss these themes, including Jones (1992), Cross (2011), Lawson (1994), and Lawson and Dorst (2009). To identify these texts, a snowballing method was used to

track down resources and to reach most-commonly cited research. Twenty-five publicly available interviews conducted with designers (mainly working in architecture, interaction design, communication design, and product design fields) in the last decade were used to illustrate the current thinking on designing and also to represent nonacademic literature. The interviews covering some questions on the design process, design roles, and expertise were selected from online magazines such as *Designboom* and other web-based resources. In addition, four interviews with design practitioners were conducted during 2012-2013, using a semi-structured interview schedule. To select the interviewees, convenience sampling was employed. These interviewees have a minimum of 10 years of design experience in product design (n=2) and communication design (n=2), and are based in the UK.

Third, literature and transcripts were examined to identify metaphors. Critical and relevant metaphors were identified based on the following criteria:

- (a) Recurrence: Is it frequently used? Is it a repeating metaphor?
- (b) Representational quality: Is it clear and expressive? Is it valid?
- (c) Relevance: Is it related to one of key aspects of design expertise: design knowledge, design skills, design outcomes, design processes, and design roles?

Schön's (1979) generative metaphor framework was utilized to reflect upon metaphors. He investigates the implications of "seeing as" within concrete experiences, in which metaphor acts as a generative force for the construction of meaning and becomes the framework for interpretation, creating particular ways of knowing. Schön (1979) states that when *A* is seen as *B*, it is then possible to explore *A* through reflecting upon values, assumptions, and meanings of *B*, and this exploration further improves our understanding of both *A* and *B*.

No software was used to identify metaphors and other researchers were not involved in cross-checking the interpretation. The focus was on "leaving a decision trail" to achieve reliability (Sandelowski, 1986). By discussing metaphors clearly and providing necessary references, the metaphors are traceable and the interpretation is verifiable. Triangulation is applied through gathering multiple perspectives of design academics and practitioners and through using multiple data sources (e.g., academic literature and interviews) in order to enhance the reliability of the research. Due to the fact that metaphors represent collective thinking rather than a single designer's opinions, the result of metaphorical analysis makes the research claims transferable. Note that the publicly available interviews were not conducted for this research; therefore what was reported in these interview on design process, skills, or expertise was limited.

### **3. Findings**

Both discourse and primary metaphors are identified in a basic taxonomy under the following key aspects of design expertise: design skills (as a composite of knowledge and abilities), design process, design outcomes, and design roles (see

Table 1 for metaphors that can be found in other texts as examples for the reader to source the data and context). Since it is not feasible to discuss all identified metaphors within this article, only selected ones are examined in order to understand how expertise is seen, how design process is understood, and what the designer's role is.

Table 1. *A Selection of Metaphors for Design and Design Expertise*

Design Skills	Design Process	Design Outcomes	Design Roles
Thinking out of the box; magic (Kolko, 2011)	Black box (Jones, 1992)	Magic; concrete solutions (Cross, 2011)	Magician (Jones, 1992)
Capturing, collecting, recalling, or building knowledge; design as tightrope walking (Schön, 1983)	Mystical journey (Calatrava, in Lawson, 1994; Cross, 2011; Lawson & Dorst, 2009)	Creative flash; a mental block lifted (Murray in Cross, 2011)	Path-finder; way-finder (Juninger, 2008)
Repertoire (Schön, 1983)	Re-inventing the wheel; incubation (Hara, in Designboom & Hara, 2014)	Eureka moment; aha! moment (Kelley, 2005)	Competitive weapon (Fujimoto, 1991)
Pencil as spokesman (MacCormac, in Lawson, 1994)	Framing the problem (Schön, 1983)	Signpost (Juninger, 2008)	Catalyst (Raby & Dunne, 2008)
Fresh eye; connecting; cross-pollination (Kelley, 2005)	Problem structuring or formulating; problem setting (Schön, 1983)	Wild ideas (Kelley, 2005)	Explorer (Jones, 1992)
Repertoire of tricks (MacCormac, in Lawson, 1994)	Reflective conversation (Schön, 1983; 1992)	Design as a marker of culture (Designboom & Hashimoto, 2012)	Bridge (Lake-Hammond & Waite, 2010)
	Dialogue (Calatrava, in Lawson, 1994)	Design as political window dressing (Sarasin, 2008)	Connector (Leung, in Mason Journal & Leung, 2012)
		A messy divorce (Boots, in Feagins & Boots 2012)	Integrator (Fujimoto, 1991)
		Unique twist (Matic in Unic & Matic, 2011)	Midwife (Ingels, in Designboom & Ingels, 2012)
			Hero (Badke-Schaub et al., 2010)
			White knight (Badke-Schaub et al., 2010)
			Illusionist (Jones, 1992)
			Gambit (Lawson, 2004)

### 3.1. Design Knowledge as Repertoire vs. Repository

Schön (1983) articulates designers' knowledge as a *design repertoire* rather than a set of abstract figures and scientific rules. Likewise, Jesse Catron, a game designer, states:

Of course familiarity breeds proficiency but I think it is important for a designer to have a versatile *repertoire* of mechanics to use according to the goals he is trying to accomplish or the problems he is trying to solve. (Belwether Games & Catron, 2012)

*Repertoire*, a theatrical and performance-related term, is a recurring metaphor and has an impact on the design discourse (Bang, 2009; Lawson, 1994; Stolterman, 2008). It often indicates that a design practitioner, whether consciously or subconsciously, draws from his or her own previous experiences. Design knowledge is often implicit, tacit, and experiential. Similarly, *repository* as a metaphor reflects the understanding of reusing the design experience. The underlying theory for both metaphors is case-based reasoning, which refers to using existing experiences and cases to analyse and solve new problems. While repertoire is a frequent metaphor, repository is rarely used. The repertoire refers to internal and digested knowledge which is regularly performed, or reused. The repository, on the other hand, refers to using an external knowledge source. Designers tend to regard the knowledge in repository as institutional, formal, and impersonal.

Ye and Fischer (2002) suggest that a cognitive barrier to external reuse might stem from a user's unfamiliarity with the contents of the repository. Brown and Duguid (2000) underline that "knowledge is something we *digest* rather than merely *hold*," and suggest that it is reasonable to say "I have got the information, but I do not understand it," rather than "I know, but I do not understand" (p. 119). It might be argued that the repository stores the design information, whereas the repertoire maintains the design knowledge. However, repository refers to knowledge as structured, open, and easy to share in comparison to repertoire in which the knowledge is personal, informal, and less organized. Repertoire implies that while developing knowledge and expertise, attention should also be paid to internalizing design knowledge, learning to perform, and not learning to store somewhere. Other important aspects of knowledge reusability are the ability and attention to capture and recall, or organize and retrieve the previous experiences and use them regularly. Each retrieving and reusing of knowledge is a way of rehearsing and making knowledge tangible. Table 2 compares implications of knowledge represented by repertoire and repository.

Table 2. *A Metaphorical Comparison of Two Metaphors on Reuse of Knowledge*

Repertoire	Repository
Implicit	Explicit
Personal knowledge	Impersonal / Institutional
Digested knowledge	Difficult to contextualize
Less structured	Structured
Ownership	Open knowledge
Difficult to share	Easy to share
Dynamic	Static

### 3.2. Developing Expertise: Climbing a Ladder

*Climbing a ladder* is a visual metaphor on how design expertise can be developed. It implies a linear and steady development. The first step is being a novice, which is ascending to the expert level, then becoming a master and a visionary. Dorst and Reymen (2004) develop a seven-stage design expertise model (Figure 1) based on the Dreyfus model of skill acquisition (Dreyfus & Dreyfus, 1980). Dorst and Reymen find this model appropriate for understanding design expertise, as it is skill oriented instead of knowledge oriented. The final two steps, master and visionary, are not part of the Dreyfus model. Being a master requires attention to details. This level addresses the craft aspect of designing. The final step, visionary, involves pushing boundaries; the designer extends the domain in which he or she works. This metaphor suggests designers acquire expertise in a step-by-step fashion.

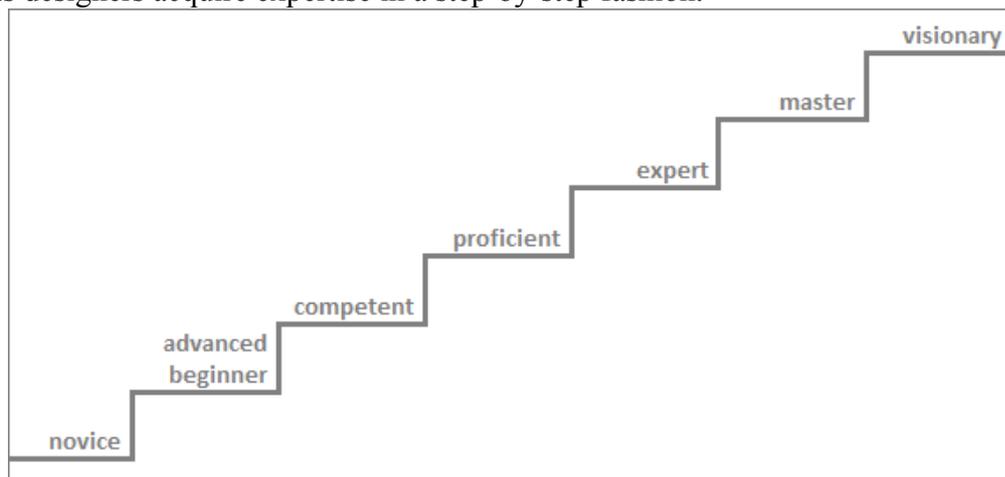


Figure 1. Seven stages of expertise (Dorst & Reymen, 2004).

Lawson (2004) claims that, unlike in sports, design expertise requires maturity, meaning that recognition comes after years of practice. It is, to a significant extent, dependent on gathering experience through time rather than an innate ability. Ericsson (2001) highlights that masters seem to consider inborn capacities and innate

talent as relatively unimportant but emphasize the role of motivation, concentration, and willingness to work hard to improve performance.

### **3.3. Design Process as Journey**

*Journey*, as a metaphor, is used widely in various contexts including research and project-based studies, such as “innovation journey” (Van de Ven, Polley, Garud, & Venkataraman, 2008). Richard MacCormac, a British architect, uses the journey metaphor to illustrate his design process:

I mean the analogy of a journey is a very interesting one. The design process is a journey, an episodic journey towards a destination which you don't know about, which is what life is and what writing and all arts like; a journey. (Lawson, 1994, p. 62)

Cross (2011) also uses this metaphor to describe the design process, in particular, design projects. He treats the design brief as the starting point and a known part of the journey. He refers to the point Rowe (1998) makes to bring a new perspective problem solving: “stand back and adopt a fresh point of departure” (cited in Cross, 2011, p. 36). Similarly, Jones (1992) likens a designer to an explorer looking for a hidden treasure, and sees design methods as navigational tools and maps. To him, a new problem is like an unknown land, of unknown extent, in which the explorer searches by making a network of journeys. Design methods assist in plotting the course of the journey and maintaining some control over where design goes. On the other hand, Lawson and Dorst (2009) use the journey metaphor to describe the overall process of developing expertise: “we see the creation of design expertise as a journey” (p. 21). For them, acquiring expertise is a long journey that commences with graduation.

Derived from Latin *diurnum* (day) and old French *journee*, the word *journey* means “a defined course of travelling; one's path in life” (Online Etymology Dictionary, n.d.). Journey, as a metaphor, reflects a process-oriented mindset. Even though the definition states a defined course of travelling, the unknown seems an important aspect of experiencing a journey, and of designing. The emphasis is on the movement—a dynamic process. Relying on maps, good equipment, and experience is more important than exceptional skills. The journey metaphor encourages designers to be curious and flexible. Since the designer cannot predict all the obstacles and opportunities lying in their path towards the goal, all they can do are to handle the obstacles, seize the opportunities, and embrace the unknown along the way.

### **3.4. Design Skills: Spokesman Metaphor**

*Spokesman* is another metaphor used by MacCormac:

Whenever we have a design session, or a crit review session in the office, I cannot say anything until I have got a pencil in my hand. I feel the *pencil to be my*

*spokesman*, as it were . . . I haven't got an imagination that can tell me what I've got without drawing it. I use the drawing as a process of criticism and discovery. (Lawson, 1994, p. 66)

Spokesman, an expert speaker who talks on behalf of a group, is the embodiment of his drawing skills, his expertise. This metaphor is an articulation of the “show, don't tell” principle of design. His deep attachment to his pencil reminds us of Polanyi's (1966) example of how a person learns to feel a tool or a probe as an extension of his or her body, similarly to how a blind man feels his way by tapping with a stick. As he becomes more proficient in using the pencil, this object transforms into a sentient and independent extension of his hand. Clearly, his pencil is the manifestation of his thinking. This implies a deep relationship between articulation and drawing. This metaphor coincides with Polanyi's (1966) idea of “understanding by indwelling” (p. 17) in which the depth of experience is an aspect of knowing.

Using drawing as a process of criticism and discovery can be also found in Schön's (1992) metaphor “*reflective conversation* with the materials of design situation” (p. 3). In such conversation, the designer reflects, that is, talks back to the construction of the design problem. Similarly, the engineer-architect Santiago Calatrava interviewed by Lawson (1994) comments, “to start with, you see the thing in your mind and it doesn't exist on paper, and then you start making simple sketches and organizing things, and then you start doing layer after layer; it is very much like a *dialogue*” (p. 26).

### **3.5. Design Process as Magic and Black Box**

Cross (1990) states “although there is such a great deal of design activity going on in the world, the nature of design ability is rather poorly understood. It has been taken to be a mysterious talent” (p. 130). The demystification of creative design has widely been the subject of research. For instance, a positivist movement in the 1980s called “design science” (Bayazit, 2004; Cross, 2001) has influenced design researchers to explain design as a rational (or rationalizable) process, or as rational problem solving (Simon, 1969). However, a number of researchers have reacted against rationalization, and have instead emphasized a phenomenological approach and considered design as a subjective process (Schön, 1992). Attempts to explain the process of designing include Lawson's (1980) book, *How Designers Think: The Design Process Demystified* and Kolko's (2011) book, *Exposing the Magic of Design*. But magic is often viewed with suspicion (Mauss, 1972) and its demystification is sought after. Reactions against mystification of design can be seen from practitioners. Vince Frost, a graphic designer, comments, “we (designers) are not mysterious people, our work is really straightforward; it just takes a lot of effort to listen really hard and to explore” (Designboom & Frost, 2008).

Cross (2011) argues that mystification of design can be a deliberate act. Some designers find mystery rather pleasant. For example, Lawson (1994) notes that

MacCormac “seems to be fascinated by the mystery of where design ideas originate” (p. 62). Designers sometimes use magic in a positive sense and associate it with creativity. For instance: “I am a graphic designer who loves creativity and magic, and my aim in life is to share these with you. I believe that we find our truest vision and purpose in the magical world of creativity” (Everlasting Magic Design, n.d.). Another graphic designer, Garry Emery, says, “What matters is the outcome. Ideally the outcome will solve all the functional criteria, be beyond the rational and be imbued with a certain ‘magic’” (Designboom & Emery, 2014). MacCormac described his practice as “having a repertoire of *tricks*” to exemplify to his original and surprising ideas (Lawson, 1994, p. 66). Lawson (2004) likens designing to the activity of a gambit, a chess player who needs to create a new and unexpected move in a chess game in order to win. Kolko (2011) also suggests that clients may desire magic because a satisfying magic show means the money being well spent on the magician.

Misunderstandings of design expertise tend to be connected to the mystification of the design process. To Jones (1992), “the most valuable part of the design process is that which goes inside the designer’s head and partly out of reach of his conscious control, in the black box” (p. 46). With the black box metaphor, the emphasis is on the input and the output, leaving the process unobservable. Kolko (2011) recognizes that much of the mystery is related to the synthesis stage of the design process that seems to be unresolved, personal, and rarely formalized. It leads to ignorance within companies, and professionals do not allocate enough time and budget to undertake the synthesis stage (Kolko, 2011). Jones (1992) points out that designers are unable to explain the processes of their outputs. The processes remain inexplicable. Another implication was observed during an interview conducted with a product designer from an innovation centre, who indicated that in conveying the message innovation and growth, the word *design* is avoided because it rarely communicates well with the business audience. He commented, “the design profession has long since sold themselves on a myth; as a result, people do not understand it” (Design Consultant C, personal communication, July 30, 2012).

Magic is commonly practised in isolation and secrecy, and a magician never discloses how the illusion is created. Two interviews conducted with communication designers also suggest that the demystification serves to protect intellectual property.

Everybody has a laptop now. They can download free software. You can do whatever you want. This has a negative effect. Suddenly the value of design is seen as less. My daughter can do it or you know anybody with computer can do it. For people who don’t value design anyway, it is devaluing design. (Design consultant A, personal communication, November 22, 2012).

Making the design process inaccessible by putting it into a black box seems to help preserve intellectual property. Whether it is a reaction to silent design or “all men are designers” (Papanek, 1980, p. 3) and “everyone designs” (Simon, 1969, p. 130),

or to prevent the downgrading of design skills, it is not clear. “Seeing design as magic or mystery” may preserve intellectual property; however, it creates associations that hardly aid trust, dependability, collaboration, and participatory design.

### **3.6. Designer as Hero**

Some metaphors in design relate designing to outstanding performance and personal talent of designers. Forty (1986) states, “[d]esign has come to be regarded as belonging entirely within the realm of the designer” and refers to it as “the myth of their own omnipotence” (p. 242). In some situations, designers’ self-image may appear as arrogance. Badke-Schaub, Roozenburg, and Cardoso (2010) criticize these special skills and functions ascribed to the designer, and used the metaphors “white knight” (p. 41) and “hero” (p. 43) to illustrate how the value of design expertise is overestimated by designers. Designers associating themselves with superheroes are becoming common (Palaveeva, 2013). Phrases such as “design will save the world/company” are seen in the design discourse (Elmansy, 2015). The *hero* metaphor is not solely associated with the task of saving the world. A hero is also recognized as a single individual, often possessing heroic traits from birth, helping but not collaborating with other individuals.

The narrative of Philippe Starck’s Juicy Salif, the lemon squeezer can be mentioned as a *root metaphor* (Sarbin, 1986) to illustrate distinctive design skills. According to Sarbin (1986), narrative is a root metaphor. Narratives, like metaphors, construct the reality through shaping an individual’s perception of the world. This root metaphor serves, perhaps strategically, to evoke emotions, to strengthen the value of design, and to increase sales. “Starck is known to suggest that design ideas come to him quite magically as if out of nowhere” (Cross, 2011, p. 6). Starck’s design story starts in a restaurant after receiving a design brief from Alessi (Lloyd & Snelders, 2003, p. 242). Starck explains “this vision of a squid like lemon came upon me, so I started sketching it . . .” (Figure 2). “If I’m quick,” Starck thinks, “I can design this before the premier piatti” (Lloyd & Snelders, 2003, p. 242). According to the story, he called Alessi the next day and said, “I’ve got a lemon squeezer for you” (Lloyd & Snelders, 2003, p. 243). The story implies that the way he arrives at the design solution and his ability to communicate his expertise are his individual skills. The story is presented in a way that the outcome is not a result of the practice or design methodology. Starck’s story embraces design genius and reduces the complexity of the design process. Although it seems to embody design expertise at first glance, it does not help the design profession, as it attaches the value of design to the individual, not to the profession.



Figure 2. Sketches on service napkin, Juicy Salif, the lemon squeezer (Carmel-Arthur, 1999).

### 3.7. Designer as Catalyst

Metaphors in design have changed in parallel to the evolving role of the designer. Anthony Dunne, the former Head of Design Interaction Department at Royal College of Art (RCA), London and Fiona Raby (also from RCA) talk about this change when interviewed by Briem and Bühlmann:

They [designers] are catalysts, I think it's becoming well known—certainly here in London—that one possible role for designers in the future is a catalytic role, and a facilitating role . . . (Raby & Dunne, 2008, p. 241)

Dunne suggests that this new role is an engaging role, and the responsibility of the designer is to connect different audiences such as the public and professionals. Raby carried this conversation further by claiming that the expertise of designers is to generate questions and to reformulate the problems, rather than to solve them (Raby & Dunne, 2008). In chemistry, when a catalyst participates in a chemical reaction, it often lowers the activation energy to initiate the reaction or increase the rate of reaction. The expertise of the designer lies in aiding collaboration between stakeholders, assisting the design process, and increasing the efficiency of collaboration. Similarly, Bjarke Ingels, a Danish architect, indicates a facilitating role with his metaphor: “In a sense we are facilitators . . . I like this idea that the architect is a midwife that we help society continually to give birth to itself” (Designboom & Ingels, 2012).

It used to be more common for designers to focus on bridging the gap between users' needs and product requirements, for example, through user-centred design. Now designers take a more versatile role in integrating different stakeholders and understanding the community. This is represented by metaphors such as *connector* (Leung, 2012). Vivien Leung, a designer who works for a design community in Canada comments, "I consider myself as the connector, the community engager, the facilitator and the instigator within the industry" (Mason Journal & Leung, 2012).

Another product designer talking about this new role claims that "ta-da" or the magician attitude has become outdated due to the risks involved in it. He indicated, "I think that the old way of doing design still happens, but going away and coming back and going 'ta-da' has a risk to it, right?" (Design consultant B, personal communication, August 11, 2012)

These metaphors place an emphasis on the value of the process of design, collaboration, and the democratization of design. Designers take part in solution finding, but do not own the solution. Design outcomes also depend on the expertise of collaborators, and the picture of this process is significantly different from Starck's illustration or repertoire of knowledge.

However, a facilitating role may lead to the undervaluing of design expertise if the distinctiveness of this role is not clarified. A catalyst is not an indispensable component of a chemical reaction; likewise, designers may not be perceived as a key elements to establish collaboration. The stakeholders may question the uniqueness of design expertise, which might lead to the loss of specialism and leadership in the design profession. If designers do not establish themselves as a distinctive part of the creation of knowledge, they may find themselves in a subsidiary role or in no role at all.

#### **4. Discussion of Metaphor Analysis**

Based on the analysis of each metaphor, it is possible to discuss some general points and compare the implications of different metaphors. Mystification and personal knowledge/ownership are amongst the main findings that arise from the metaphor analysis. The analysis indicates that seeing "designers as magicians" has different implications than seeing "designers as catalysts" or "midwives" regarding the ownership of the design process and how the outputs are developed. Similarly, describing the design process as a "black box" or "journey" are not the same. Although both are associated with the unknown, the implications of the unknown are different. The idea of journey is associated with maps and travel; it encourages the experience to manage unknowns and relates it to making discoveries. The black box metaphor, on the other hand, is related to the mysterious and unknown; it inhibits observation, leaving the unknowns unapproachable and irresolvable, which makes it difficult to share designing with peers and other stakeholders.

Obscuring metaphors can lead to an informal design process, which provides solutions that often rely on the personal skills of the designer or simply on serendipity. This results in companies not believing that the design process can be managed and therefore not allocating enough time and budget to the design process. The analysis suggests that the design profession benefits if designers' knowledge is both a design repertoire and repository. If designers' knowledge is solely seen as a design repertoire, it might be difficult to externalize and share this knowledge. The metaphor of the black box or repertoire implies that the failures of the design process are hidden from view. As a result, these experiences are often not recorded even at the company level and are mostly forgotten. Such an approach can also hamper the improvement of design practice.

Some metaphors discussed above illustrate how design expertise can be developed. For example, while the repertoire and the climbing a ladder metaphors imply that design expertise is acquired by experience in time, the hero metaphor entails design expertise is an individual strength of a designer. Hero also conveys a message about outstanding skills, fame, and fortune. This is an individual status rather than a professional status. Thus, the profession itself does not benefit from the same status and prestige in society as the designer himself or herself. This may also lead to the perception that the value of design is associated with individuals.

Although metaphors represent a collective thinking, metaphors reported in this article are based in a western culture and not all metaphors maintain the same meaning when applied by individuals from different cultures. Differences in meaning occur between different languages and cultural contexts (Chilton & Ilyin, 1993).

## **Conclusion**

The notions of design and design expertise are often argued about, but rarely agreed upon by the design community. This is a result of the multifaceted nature of design and the various underlying assumptions, theoretical anomalies, and fragmented knowledge in the field. By presenting a metaphorical analysis on design expertise, this article illustrates that metaphors can be devised to uncover people's ideas, values, and attitudes towards design and design expertise. Metaphors included here show how designers engage various aspects and activities. By utilizing Schön's approach, the article has traced the implications of metaphors for the design profession. This approach also makes it possible to draw some recommendations for design practitioners. Note that these recommendations are context specific. If participation and co-design are becoming increasingly important in the community, designers should avoid the metaphors that inhibit collaboration. Although the personification of design knowledge and being wilfully obscure about the design process may create a sense of curiosity, mystification, and ownership, these mostly hinder collaboration. Mystification also leads to credibility and trust issues. It can be argued that based on

the analysis of metaphors, some of the credibility issues and ambiguities of design can be resolved.

This article contributes to designers' critical awareness of metaphors and their power to shape the perception of design processes, knowledge, and expertise. This awareness can bring a sharper understanding of design issues and more explicit confrontation with design debates that embody different metaphors. Each metaphor conveys a different view of reality, and represents particular ways of seeing. Designers may therefore choose metaphors to communicate their expertise by considering the meanings and implications generated thereby. Metaphors represent a distillation of information and help to assess how perceptions and measures evolve over time. This evolving aspect of design expertise and attitude lends itself to be studied effectively through the use of metaphors.

This article is the first attempt to apply this kind of metaphor analysis to design expertise. It opens up a debate on the significance of metaphors on design expertise, and discusses their implications on how design expertise is understood. Using metaphors as a way to discuss design expertise is a broad subject and there is room for further investigation. This article covers only a selection of the metaphors; many more metaphors remain to be discussed to represent the overall complexity of design and contribute to the improvement of design practice.

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