METAPHORS IN DESIGN CURRICULA

Viktor HIORT AF ORNÄS[1], Martina KEITSCH[2] and Kjersti SCHULTE[2,3]
[1]Department of Product & Production Development, Chalmers University of Technology
[2]Department of Product Design, Norwegian University of Science and Technology
[3]SINTEF Raufoss Manufacturing

ABSTRACT
Metaphors are central to the way we see and shape the world, and identifying metaphors can help to question how certain issues are explained or set-up, thereby opening up a range of opportunities for design. This paper explores how metaphors can contribute to understanding theories and models, as well as problems and opportunities in design courses at different levels. Following the introduction, section two and three introduce metaphors, and identify the roles metaphors play in design and design education with help of analyzing three examples in design curriculum. The fourth and final section discusses educational implications of metaphors as tools to inspire and facilitate knowledge generation in design curricula.

1 INTRODUCTION

Design is art. Design is problem solving. Design is a journey. Design is a bricolage. Design is creating specifications for that which does not yet exist. Design can be seen from many perspectives, and is often described by using a metaphor [1, 2, 3].
"Metaphor has the extraordinary power of redescribing reality" [4]. Metaphors shifts attention to certain features; changes the salience of certain aspects. In design metaphors matter for how problems are framed, for the ability and legitimacy of different stakeholders to influence a project, as a way of generating ideas, as well as for overall themes for a project, driving decisions. A designer, who sees design as a process of selection is more likely to list options and then select between them, whereas a designer who views design as a dialogue is more likely to generate and test a number of options with stakeholders, iterating towards a solution. Engaging with metaphors can help students frame and reframe problems; "Instead of re-using known design schemas and familiar solutions, the implementation of metaphors in practice can contribute to unconventional thinking and thereby generate more innovative design products" [5].
In prior papers, we have discussed the importance and challenges of engaging design students in reflections on underlying perspectives and assumptions of different starting points, and that the understanding of design theory can be facilitated by contextualizing it within more applied activities in design education [6]. Furthermore, teaching and learning activities at different curricular levels should take different forms. Students at higher levels are expected to display and should also be given reflexive independence to autonomously seek new knowledge expansion and insights. However, novice students should be gradually introduced to tools and techniques enabling them to cope with complexity, exposing students to challenges that are just within reach [7].
In curricula, metaphors provide ways of understanding theory and can also support training the students' critical reflexivity and professional skills. This paper explores how metaphors in an educational context can both be used in a practical perspective and contribute to understanding concepts, models and applications in design courses at different levels.

2 METAPHORS AND DESIGN

Metaphors bring out the thisness of a that, or the thatness of a this [8, p.503]. The term metaphor stems from Greek metaphora – 'a transfer'. A metaphor is per definition a comparison between two or more seemingly unrelated subjects, where the first is described as seemingly equal to the second in some way.

Metaphors emerge through an imagination, which connects denotative and a connotative meaning. In 1979, Nelson Goodman emphasized the significance of metaphors for the process of structuration and interpretation of the human world. In Goodman's opinion metaphors are important elements in the process of knowledge generation: "…in replacing some 'stale' natural kinds with novel and illuminating categories, in contriving facts, in revising theory and in bringing us new worlds" [9, p.125]. In addition to definitional and descriptive explanations, metaphors provide specific means for understanding and indoctrination, which can be more powerful than direct arguments. Metaphors affect the way we perceive the world, categorize experiences, and organize our thoughts [10]. They convey ideas but also distort and simultaneously reveal and conceal [3], highlighting different areas of concern, entailing different priorities.

Metaphors provide ways of understanding theory. Besides training a critical reflexivity towards texts, metaphor analysis can enhance the learners' capability to grasp the theoretical foundations of a subject instead of learning én route. Metaphors have a heuristic character, they can help to negotiate meaning and find a consensus. Metaphors often appear as linguistic affair however, Lakoff and Johnson [10,11] suggest that metaphors are not only a matter of language but depend on bodily experiences as well. This is supported Parsons [12] who proposes that metaphor is a kind of connection between body and mind. In education, this opens up for new and creative ways of understanding with the help of metaphors.

The strength of metaphors is the way that they form images and understanding. On the other hand, it is crucial to understand that metaphors are simplifications, where certain characteristics are emphasized and others are ignored [13]. For example, economic metaphors have large influence on our society, also in non-business areas such as politics, and academia [14]. Notions such as 'market' and 'competition' are so widely used in design as well, that we might not recognize them as metaphors from an economic theory anymore. Lakoff and Johnson argue, that "we often take the metaphors of our own culture as truths" [10, p.186]. The idea of competitive markets as a 'natural law' originated in 1786 in Jospeh Townsend's dissertation about the struggle for existence between goats and dogs on the island of Juan Fernandez [15]. Successful metaphors in economic theory refer to phenomena in real-life and are reinforced by becoming part of the natural language [14].

Design has particular strong relationships to metaphors. Metaphors tacitly affect how design is viewed and discussed as e.g. Schön points out in his famous article "Generative Metaphor": "Once we are able to see a slum as a blighted area, we know that blight must be removed ('unsanitary and unsightly') buildings must be torn down (…) The metaphor is one of disease and cure" [16, p.147]. Metaphors can also deliberately support design thinking [5], noticeable in designs such as the desktop metaphor for computers, in drawing on parallels to nature (see e.g. Benyus work on Biomimicry [17]), in methods for generating ideas [e.g. 18], embodying brand values [19], or communicating about products [20].

Metaphors are used to convey ideas. In working with students' information search Gröppel-Wegener and Walton [21] compares the search for academic sources to fishing a sea of information that can be surfed or trawled yielding large number of catches or fished more selectively. Some sources are shallower, others deeper and more theoretical, some catches have more teeth and possibly require more struggle. Like diving, the practice of dealing with different sources takes practice.

Metaphors are also central to design practice; "…even when playing with geometry, the process is never entirely geometrical. Shapes are never merely just shapes but also sunbursts, leaves, rays, clouds, tokens, wings, crystals, windowpanes, walls, symbols, reminders of shapes previously encountered, previous design experiences, and precedents. Each metaphor brings with it new entailment and new actions" [22, p.115]. Metaphors are crucial for communication in design processes surrounding products, which often requires balancing different perspectives (e.g. manufacturability, price, expression, usefulness for the end user etc.). Design is here seen as a collaborative activity in which different actors have a more or less strong say. Describing the target group as users may here imply an emphasis on products as tools to be applied for some purpose whereas describing the same group as customers may imply an emphasis on products as goods and economic transactions. Metaphors play a central role in the discussions and discourses between different actors. How a project is framed also affect the legitimacy with which different stakeholders can affect outcomes.

3 ROLES OF METAPHORS IN DESIGN EDUCATION

Metaphors are important to design theory, practice and education. However, students naturally face difficulties in understanding the role metaphors play for design.

3.1 Example1: Metaphors in Ideation

Our first example concerns a master course in form design given at Chalmers University of Technology 2013. The students are from a technical program and trained in addressing aspects of use (relevance, usability etc.) as well as mechanical design. However, in this course, students should to engage in a design tasks from the other end; i.e. letting aesthetics and symbolism drive the project.

As part of this course we held a workshop in which the ambition was to engage students in reflection on how metaphors could drive a design proposal. Students were given a set of random metaphors focusing on artefacts, animals, characters (e.g. super heroes and famous actors) and activities.

These were selected to comprise metaphors that had physical characteristics, behaviours, and abstract activities The students were asked to move in a stepwise process: First analyzing the metaphor in terms of physical properties and structure, behaviours and function, and assessing its significance in terms of values represented by the metaphor (b) Try to apply the metaphor to a new solution (a lunch box) in a projective exercise.

Figure 1. Some of the metaphors given to students (Cards courtesy of Maral Babapour)

While the students did develop novel ideas, they seemed to have problems choosing a metaphor to explore in depth. It seems they easily got entangled in transferring surface level attributes, but that they had problems transferring more implicit content such as symbolism, behaviour and relations between elements to their design problem.

3.2 Example 2: In-situ Metaphors

Our second example concerns a master course in "Design strategy" at The Norwegian University of Science and Technology in 2014. The learning goal of the course is to understand the complexity of a business. The students develop a future vision for a case company, and then frame specific strategies consistent with the vision. One strategy concerns business relationships. Throughout the design study the students have learned to analyze competitors and to differentiate products in the market place. These tools are in line with the competitive market view in economy, which is commonly illustrated by the metaphor the 'jungle' [15]. On the other hand, a relational strategy may also focus on cooperation between companies, mutual dependencies and interaction among actors a view that can be illustrated by the metaphor 'rainforest' (Ibid.).

The ten students were first asked to contemplate on how they view the business world, and their first association was competition. Then the students were asked what they associate with the words 'Jungle' and 'Rainforest'. Associations to 'jungle' were dangerous, wild, and the survival of the fittest. In contrast, the 'rainforest' is harmonic, diverse, and fruitful. Throughout the rest of the discussions, we alternated between focusing on the competitive situation for the case company and its interaction

with suppliers and customers. The class clearly understood these metaphors. The metaphors were also introduced in a similar course in 2013. But then the majority of students could not differentiate between the two metaphors. One reason might be that in 2013 the course was taught in English, whereas in 2014 the entire class was speaking Norwegian. When the students did not see a difference between the two words, the metaphors did not function as different lenses to use on the case.

3.3 Example 3: Metaphors in PhD education

Our third example concerns the PhD course "Topics in Design research" at The Norwegian University of Science and Technology, which aims to provide insights in prominent design theory paradigms. The course covers a theory of science introduction for designers, as well as a discussion and analysis of design theories. One assignment in the course was to detect and analyze the use of metaphors by the authors of three theories to evaluate if they were consistent with their theories. The five candidates were firstly introduced to metaphors and followed by one-month homework to examine metaphors in the texts. The candidates detected metaphors and were able to discuss if these contribute to clarify or blur the author's message. However, they did not have a lot of background knowledge about the authors, the history and the context of the theories, and only found the most obvious metaphors. A positive aspect was their genuine interest in how metaphor analysis can be done and their surprise of how greatly the metaphors influenced the meaning of the text. Students on this level understand that these texts have relevance for their research work and therefore theories are interesting. A future approach should give a more design-specific introduction on metaphors.

Table 1. Roles, Benefits & Challenges for the specific examples

	Example 1: Ideation	Example 2: Realization	Example 3: Recognition
Role	Analyzing and projecting metaphors on a design solution	Analyzing the business world for a case company	Analyzing metaphors benefit for clarifying design theories
Function/ benefits	Training students in actively elaborating problem- and solution space	Explaining concepts from another domain (economy). Making students aware that theories influence how we view the world	Making students aware of the implicit power of metaphors, ideally training them to consciously use metaphors in their writings
Challenges	Students had problems moving beyond literal analogies	Understanding differences between alternative metaphors	Poor background on design theories and their epistemological fundaments

Comparing the examples from courses above, we see different roles for metaphors in design education, serving different functions and implying different types of challenges. Regardless of whether students engage with surface level attributes, or underlying relations and implications, working with metaphors require practice, skill and prior knowledge.

4 EDUCATIONAL IMPLICATIONS

Metaphors inspire and facilitate theory and practice knowledge generation in design curricula. As the former sections illustrate, metaphors can play different roles in education, implying different levels of engagement, requiring different levels of skill and effort, but also have differences in potential impact. We see the following as main opportunities for the use of metaphors in design curricula:

- On a basic level, metaphors can inspire and enable playful comparisons of similarity in appearance or behaviour, which may support speculative reasoning e.g. *transferring* manifest and implicit attributes from one context to another for ideation purposes (What if the product was like…?). While exercises as that in example one above do not imply any deep engagement with a material, they may serve as entry points for working with metaphors.
- On a an epistemological level metaphors may serve as lenses supporting *seeing* a phenomena from a specific perspective ('seeing as')

- Using metaphors as keys to perspectives may also give students a more comprehensive understanding of a theme. Given that students get the conceptual tools and skills to engage with the metaphors that shape our understanding they may start questioning starting points and underlying values, *employing* the metaphor in reflections and explorations around a theme
- On meta-level metaphors may contribute to critical reading of a text or concept. *Comprehending* the metaphor as such, including assumptions and implications can also teach students how to use metaphors deliberately in their own texts. Training in analysis of metaphors could make students aware of ideological terms in design literature and might strengthen their analytical abilities and argumentation skills, drawing attention towards what is 'taken-for-granted'.

In the courses described in the prior section, students sometimes found it challenging to come to terms with specific meanings of certain metaphors. To use a concept as a metaphor students need to be familiar with it. Seeing how phenomenon is framed is potentially powerful, but seeing what a certain metaphor reveals and conceals presupposes knowledge on how the phenomenon could otherwise be portrayed. Making assumptions, axioms and values explicit may also require that different metaphors are compared and contrasted, see [16]. Before developing fluency and a repertoire, students may find the introduction of different metaphors confusing. Furthermore, students from engineering disciplines may have a difficult time coming to terms with the inherent vagueness of metaphors as they are typically schooled into putting premium on precision and grand truths rather than competing narratives. An additional challenge with metaphor exercises lies here in their indirect character – metaphor analyses do not provide immediate benefits and are time consuming. A task for the teacher is here to guide the students not just through the recognition and application of metaphors but also to show their limitations.

Metaphors are pedagogic tools for conveying certain ideas, providing ways of structuring thinking and understanding abstractions. Advanced students might also benefit from explicit discussion on metaphors as such to support reflections on their own practice. Text analyses can e.g. be included in design curricula with the goal to understand and build explanations, arguments and metaphors.

Metaphors can support learning in novel ways and contexts. For beginners, they can be used to encourage students to structure thinking and understand abstractions. In the medium phase of education, metaphors serve to making students aware of ideologies in design literature and this might strengthen their analytical abilities and argumentation skills. For advanced students - understanding metaphors trains their attention towards what is 'taken-for-granted' and contributes to revise petrified assumptions Engaging with applying but also scrutinizing metaphors can support students in practical design work, as well as reflections on their practice.

While it is not certain that it will help the students come to terms with what design is, actively employing and examining what different metaphors enable and entail may help expand perspectives on what design *can* be, in general as well as in a specific project.

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