

# Generative sensing in design evaluation



Andy Dong, Faculty of Engineering and Information Technologies,  
University of Sydney, Sydney, NSW 2006, Australia

Massimo Garbuio and Dan Lovallo, The University of Sydney Business  
School, University of Sydney, Sydney, NSW 2006, Australia

*The analysis of design review conversations from a junior-level undergraduate industrial design course and an entrepreneurship course uncovered a new pattern of design thinking. Design thinking during concept evaluation contains a recursive hypothesis-driven pattern that we name generative sensing. Generative sensing commences with deductive reasoning from established rules to a definitive conclusion in favour of or against a concept. These conclusions become the basis for new hypotheses that suggest actions to address problems or invite rebuttals to defend the original logic of the concept. Generative sensing is a pattern of design thinking that creates ways through the design problem by testing propositions in a recursive manner.*

© 2016 Elsevier Ltd. All rights reserved.

*Keywords: decision making, design thinking, abduction*

A normative model of the design process describes it as proceeding from concept generation to concept evaluation to concept selection (Nikander, Liikkanen, & Laakso, 2014). Design thinking alternates between divergent thinking during concept generation and convergent thinking during concept evaluation and selection (Leonard & Sensiper, 1998). Although scholars acknowledge iterative loops between these stages, the accepted practice is that concept evaluation should only examine the merits of a concept, determining the quality (value or worth) of a concept against established objectives as a function of one or more of its attributes (Thurston, 1991). To assist designers in this evaluation, researchers have proposed a number of metrics to prove or disprove the merits of a concept, such as its creativity (Nelson, Wilson, Rosen, & Yen, 2009; Oman, Tumer, Wood, & Seepersad, 2013; Shah, Smith, & Vargas-Hernandez, 2003; Verhaegen, Vandevenne, Peeters, & Duflo, 2013).

Concept selection follows concept evaluation, leading to the selection or consolidation of one or more concepts for further development. Here, too, a range of normative decision-making tools and methods for concept selection exist, including concept screening (Ulrich & Eppinger, 2004), pair-wise comparison charts (Dym, Wood, & Scott, 2002), concept scoring matrices (Frey et al., 2009; Pugh, 1981), multi-attribute utility analysis (Scott & Antonsson, 1998; Thurston, 1991), and Pareto dominance (Malak & Paredis, 2010). The

**Corresponding author:**  
Andy Dong  
[andy.dong@sydney.edu.au](mailto:andy.dong@sydney.edu.au)



[www.elsevier.com/locate/destud](http://www.elsevier.com/locate/destud)  
0142-694X *Design Studies* 45 (2016) 68–91  
<http://dx.doi.org/10.1016/j.destud.2016.01.003>  
© 2016 Elsevier Ltd. All rights reserved.

preponderance of quantitative models for concept evaluation and selection, as compared to concept generation, suggest that they are two design stages most amenable to analytical thought.

Lost in the substantial body of scholarship on concept evaluation and concept selection, though, is the quality of the decision making process itself. Borrowing from the scholarship in strategic decision making (e.g., taking a decision to expand the scope of a company through a new product or service), a broad body of management literature points to the conclusion that decision processes matter to the performance of the project first and to the performance of the firm second (Fredrickson & Mitchell, 1984; Papadakis & Barwise, 2002). A large sample study of strategic decisions has highlighted how strategic conversations are substantially more important than the financial analysis of a decision in shaping the outcomes of such decisions (Garbuio, Lovallo, & Sibony, 2015). In this study, it was ‘how’ the executives talked about the decision and its underlying assumptions that affected whether expectations (in terms of market share or profitability) were met, not ‘what’ financial analysis was performed.

Given prior scholarship, this research began with the intention of testing and questioning the normative assertion that concept evaluation entails analytical, convergent thinking. A high-quality design review conversation should exhibit a rigorous discussion of the merit of the presented concepts. We believe a high-quality design review conversation should also hypothesise future possibilities. Laboratory studies of design concept evaluation and selection already show that the decisions do not consist exclusively of convergent, analytical thinking, and further that the form of logical reasoning influences the direction of the selection decision (Dong, Lovallo, & Mounarath, 2015). The empirical results of this study will point to a more substantial finding, a new pattern of design thinking. The research context consists of the review of design concepts presented throughout a junior-level (third-year) undergraduate industrial design course and the final presentations of an entrepreneurship course at a public university in the United States. The conversations in the industrial design course concern the evaluation of multiple design concepts, which can lead to the abandonment or further development of design concepts until a final concept is chosen. In contrast, the entrepreneurship presentations communicate a single project and are representative of the type of presentation to an executive committee tasked with making a resource allocation decision about how much to fund, if at all, the proposed project (Bardolet, Fox, & Lovallo, 2011). The article describes the method of analysis and the recursive, hypothesis-driven pattern of the design thinking uncovered.

## *1 Theoretical frameworks*

Concept evaluation is grounded in theories about normative decision-making methods. A rather substantial body of literature largely reaches the conclusion

Download English Version:

<https://daneshyari.com/en/article/261452>

Download Persian Version:

<https://daneshyari.com/article/261452>

[Daneshyari.com](https://daneshyari.com)