

## **IS MODEL-MAKING SKETCHING IN DESIGN?**

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### *Extended Abstract*

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Considerable research has been done by various scholars to assess the significance of sketching in the early stages of the design process. Gabriela Goldschmidt, Vinod Goel, Donald Schön, Masaki Suwa, Barbara Tversky, John Gero, Bryan Lawson are among researchers who have conducted analytical and empirical studies focusing both on freehand sketching with conventional methods (using pen and paper) and sketching in contemporary media using computer-aided sketching tools. However, sketching in design studies usually corresponds to drawing and the extensive research on the cognitive aspects of sketching does not always include three-dimensional sketching through physical and digital models produced in the early phases of design process. Despite the general tendency in literature to underline the importance of model-making in the design process, its effects on the cognitive process are not sufficiently articulated. The aim of the presented research is to identify some characteristics of model-making that make it effective in the design process and design cognition as a form of sketching. The general motivation is to open way to further research on the role of physical and digital models in the early design processes and in architectural design education.

Key research on sketching articulates its uncertain nature as a positive drive in early design phases. Goel (1992) compares the effects of different representation techniques –drawings- on the cognitive design process. The results accentuate the importance of using ill-structured representations for ill-structured problems which are corresponding to using fuzzy (ambiguous) drawings instead of hard-line drawings during the early design process. Goel's experiment has showed evidence that significantly more "lateral transformations", at both the syntactic and semantic levels were developed with the ill-structured representations than with the well-structured representations. Goldschmidt (2003) also points out that an ambiguous representation prevents the early crystallization of ideas, thus "helps defer commitment to a solution". Drawing from this fuzzy character of sketching,

this paper looks at whether physical and digital models done during the early design process are also fuzzy and enable “lateral transformations”.

The inquiry is conducted with three graduate students of architecture having similar degrees of professional experience and skills of making physical and digital models. The participants are given three architectural design tasks which are similar in terms of contextual, functional and programmatic complexity and scale and are asked to solve the given design problems by using three different mediums: free-hand sketches, physical models, and digital models. In order to neutralize the effect of the individuals, each participant is involved in all the sketching media mentioned. So at total, nine experimental sessions, each lasting 90 minutes are realized.

The design tasks consist of formal explorations for mixed-use buildings in urban plots. The plots chosen have specific topographic qualities such as being sloped, being next to a bridge or on the waterfront, having different levels, etc that expectedly calls for three dimensional inquiries. A simple site analysis is presented to the participants prior to the sessions. All of the design sessions are recorded using cam-corders and the participants are asked to think-aloud during the design protocols in their native language.

The Linkography method developed by Goldschmidt (1990) is used for the analyses of these protocol studies. Types and numbers of the links are interpreted to identify the “lateral transformations” comparing the sessions with physical and digital models and the sessions with free-hand sketches. The qualitative data in cam recordings and spoken protocols are utilized in support to whether data deducted from the Linkographic studies verify the observational data of the authors.

However the conclusion is that the amount of lateral transformations is not always an indication of ambiguity.

**Keywords.** design; design protocols; sketching; model-making; reflective practices; cognition; computer-aided design; Linkography.

### Sample References

- Goel, V. (1992). "Ill-Structured Representations" for Ill-Structured Problems. *Proceedings of the Fourteenth Annual Conference of the Cognitive Science Society*.
- Goel, V. (1995). *Sketches of Thought*. Cambridge: M.I.T. Press.
- Goldschmidt, G. (1992). Criteria for design evaluation: a process- oriented paradigm. In Y. Kalay, *Evaluating and Predicting Design Performance* (pp. 67-79). New York: John Wiley & Son, Inc.
- Goldschmidt, G. (2003). The backtalk of self-generated sketches. *Design Issues* , 19 (1), 72-88.

- Goldschmidt, G. (1995). The designer as a team of one. *Design Studies*, 16 (2), 189-209.
- Goldschmidt, G., & Tassa, D. (2005). How good are good ideas? Correlates of design creativity. *Design Studies*, 26, 593-611.
- Kan, J. W., & Gero, J. (2008). Acquiring information from linkography in protocol studies of designing. *Design Studies*, 29, 315-337.
- Kan, J. W., & Gero, J. (2005). Design Behaviour Measurement by Quantifying Linkography in Protocol Studies of Designing. *Human Behaviour in Design'05* (pp. 47-58). Sydney: Key Centre of Design Computing and Cognition.
- Lawson, B. (2006). *How Designers Think*. Boston: Elsevier.
- Paynter, K., Shillito, A. M., Wall, S. A., & Wright, M. (n.d.). How can haptic feedback allow an applied artist to externalise their ideas more intuitively during the germinal phase of the creative discovery?
- Rodgers, P. A., Green, G., & McGown, A. (2000). Using concept sketches to track design progress. *Design Studies*, 21 (5), 451-464.
- Schön, D., & Wiggins, G. (1992). Kinds of seeing and their functions in designing. *Design Studies*, 13 (2), 135-156.
- Suwa, M., & Tversky, B. (1997). What do architects and students perceive in their design sketches?: A protocol analysis. *Design Studies*, 18 (4), 385-403.