

Sketching and Gesturing for New Ideas in Collaborative Design

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Abstract: In searching for practices that feed creativity, we compared sketching—an acknowledged design practice that facilitates creativity—with gesturing, which shares many of the features important for ideation by sketching. Analyzing two higher education textile design projects, we found that sketching and gesturing fulfilled differing epistemic roles, although there were some parallels. We suggest that both sketching and gesturing should be treated as epistemic practices that extend beyond easing communication to eliciting new ideas.

Introduction

Creative practices are the core of design education. Creativity is also an important twenty-first century skill (Sawyer, 2018). Collaborative design includes communication and coordination, but these two functions are not sufficient for successful designing. Creative design not only reproduces existing solutions but entails emergence—that is, solutions are unexpected and cannot be foreseen or reduced to individual contributions (Sawyer, 2003). Successful designing requires “seeing things differently” through exploration rather than systematic search and combining of ideas (Cross, 1982). One important design practice that facilitates creativity (i.e., idea generation) is freehand sketching (Purcell & Gero, 1998). However, while sketching appears beneficial to professional designers, it does not always deliver for novices (for a review, see Härkki, Seitamaa-Hakkarainen & Hakkarainen, 2016a). In search of practices for design education, we compared sketching with a practice that shares many of the same emergence-facilitating features; that practice is gesturing. In particular, we set out to identify *the epistemic roles of sketching and gesturing in collaborative design*. Further details of the three studies summarized here are available in Härkki, Seitamaa-Hakkarainen and Hakkarainen (2016a, 2016b).

Designers benefit from sketching and gesturing

As a skill, design sketching differs from artistic drawing. According to Goel (1995), *sketches are deliberately left imprecise, ambiguous, fluid, amorphous, and indeterminate. Sketches are abstractions, schematizations, and conceptualizations* (Tversky, 2011); *they are not realistic depictions like drawings*. In this way, sketches allow for multiple interpretations, which is considered central to idea generation (Goel, 1995). Gesturing is also based on ambiguous abstractions. Gestures serve several important functions for education (Alibali & Nathan, 2012), which gesture researchers summarize as follows. Through activation, manipulation, packaging, and exploration of spatio-motoric information, *gesturing can lead to changes in both the content and direction of speech and thought, generation of new ideas and ideas that cover a wider range of conceptualizations, to revealing emerging knowledge not available through speech, as well as enhancing abilities to perform spatial transformations* (Kita, Alibali & Chu, 2017). Yet, despite this evidence, gestures are rarely studied as a resource for idea generation. According to our literature review (Härkki, Seitamaa-Hakkarainen & Hakkarainen, 2018), gestures are important for idea generation because *the ambiguity and spatio-temporal character of gestures facilitates the expression and study of ideas in visual, spatio-motoric and kinesthetic dimensions and invokes new interpretations—new ideas to steer the work in unforeseen directions*.

Methods

The research setting encompassed two textile design projects: 3D textile puzzles for visually-impaired children and sea creature accessories for kindergartners. The participants (first-year students on a craft teacher program at the University of Helsinki) worked in teams of three. In total, 7 teams and 9 hours of video were analyzed. Focusing on the epistemic roles of sketching and gesturing challenged existing methods of analysis in terms of how to preserve their indigenous visual, spatio-motoric and kinesthetic character. To that end, a rigorous micro-level method of *video-based qualitative content analysis* was developed. Rather than transcripts, the analysis utilized video and segmentation principles that separated each gesture stroke and sketching act (continuous pen-movement) for each participant. Categorizations of the characteristic uses, i.e., the epistemic roles, were developed for each study.

Major findings

The developed categorizations revealed that the epistemic roles of sketching and gesturing in collaborative design did align in some respects. Both *introduced several hundred meanings* into the design conversation *that were not*

available in accompanying speech. Those meanings (e.g., round; cabin; soft; this; write; that class) often related to structure and metacommunication. Even those parts that did not provide complementary meanings (or could be considered redundant) could not simply be deemed unnecessary; rather, *they are co-expressive and engage modalities other than language in a communicative move*, making messages easier to understand. On the other hand, sketching and gesturing played several epistemic roles that differentiated them in line with their indigenous character. *Sketching was favored for structural explorations, especially those requiring precision and memory. Gestures, as spatio-kinesthetic analogues, were favored for sensory, spatio-motoric, and experiential content.* For designing, all of these are central aspects.

Conclusions and discussion

This research contributes to the discussion on transforming pedagogy into creative learning outcomes (Sawyer, 2018). We suggest that, in the search for productive epistemic practices for creative ideation, gestures should not be disregarded. Gestures are co-expressive and make messages easier to understand. More importantly, as ambiguous abstractions restricted by the affordances of our motor-system, gestures share features that are central to idea generation by sketching. The ambiguity of sketches is advantageous for design ideation (Goel, 1995); in the same way, the ambiguity of gestures should be seen as advantageous for generating new ideas.

In collaboration, the individual designer's thought processes are interconnected, nourished, stimulated, and inspired by the actions of other team members. Rich and varied use of all available resources (i.e., language and other modalities intertwined) serves to multiply the number of meanings fed into the conversation. That multiplication in turn enhances the potential to engage various sensory channels, sparking inspiration and enhancing the team's capacity to share, evaluate, and build on each other's contributions, as well as their potential for idea generation. *At best, active and rich gesturing and sketching in combination with speech can turn interaction into inspiration—that is, interaction that inspires—eliciting new ideas and (even) more productive interaction.* Likewise, *the epistemic roles of sketching and gesturing could entail the ability to elicit more ideas by enhancing the intensity and richness of collaborative designing.* We therefore contend that sketching and gesturing should be approached as epistemic activities—ways of thinking, developing, and inducing new thoughts, as well as enriching the plateau of inspirational material for ideation.

Unfortunately, increased potential and more cues do not automatically enhance idea generation. Shared cues need to be noticed, and appreciative perception may be the requisite counterpart to unreserved sharing. Our tentative conclusion is that engaging multiple modalities in sharing ideas as they emerge and recognizing each other's contributions may benefit students as much as any single creative practice. It seems reasonable, then, to ask if sharing and paying attention should be seen as important epistemic practices for creative collaboration.

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