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# Collaborative Visual Design: Representation and Resources

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We are working on a framework for a comprehensive and coordinated representation of authentic collaborative visual design activity. Taking a multidisciplinary and ethnomethodological cognitive approach, we investigate how designers use graphical and natural language in a coherent discourse that supports their collaborative negotiation and design activities. We focus on how knowledge can be represented, shared, and transformed throughout these activities, and consider how we may represent designer knowledge. The representation framework emerges from our on-going applied research in collaborative Web design and is realized in an interactive multimedia research environment (Blatter, 1998). We present a brief overview of the representation framework as an analytic resource.

Collaborative visual design and its products are ubiquitous features of work in industry and education. However, the knowledge constructed by designers in design practice is not well understood, and current cognitive science paradigms are challenged by representing and researching designer knowledge.

Our framework is multidisciplinary, calling on cognitive research in display-based and diagrammatic reasoning (Larkin, 1989; Goel, 1995), situated cognition (Greeno, 1989), activity theory (Cole & Engestrom, 1991), as well as theories in visual design practices including software design, architecture and graphic design (Winograd, 1996; Arnheim, 1993, Tufte, 1983). Our approach is informed by discourse analysis (van Dijk and Kintsch, 1983) and its application in cognitive science (Bracewell & Breuleux, 1994), sociolinguistics (Hymes, 1974), and visual semiotics (Goodman, 1976).

Our framework supports a view of design as being mediated, situated, and socially constructed in dynamic and complex situations in which agents co-develop external representations in natural and graphical languages that support multiple objectives and processes. We represent the multiple types of representation -products and processes- as consisting of visualizations, conversation, and semantic links. Visualizations include the final design as well as intermediary graphical products. Conversation is segmented into turn-taking units incorporating verbal as well as visual acts. The semantic links act as a controller for the knowledge needed to coordinate multiple types of representations as coherent discourse.

This representation framework supports our work through a research tool which retrieves multimedia, text, concept maps, design versions, analytic layers and views. We code

semantically linked turn-taking and visual acts as negotiated design actions which may be further analyzed and presented in various views.

Our tool and approach has significance for cognitive researchers and educators. For researchers, it allows a richer representation of design as a complex activity by offering multiple representations and views, preserving the cohesion between visual and verbal languages and consistency in sequential interaction. For educators, our framework can guide multimedia design projects, facilitate richer understanding of the work of collaborative designers/learners, and foster the development of new forms of qualitative assessment that better reflect the complexity and quality of collaborative design.

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