Chapter 5
Externalized Design:
Expressing Social Ideas in Software

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ABSTRACT

In this chapter, the author presents a conceptual framework for early-stage interaction design (EDOS) together with a method for embedding conceptual artifacts in user interfaces. The notion of 'externalized design' from postmodern architecture is used as an analogy for how to incorporate conceptual artifacts like social ideas in user interfaces. This is proposed as a new approach to theory-based design in human-computer interaction (HCI) and computer-supported collaborative learning (CSCL). The framework is applied to the retrospective analysis of two interactive systems the author has been involved in designing over a number of years. These systems were stimulated by two concepts associated with American pragmatism (generalized other, reflection-in-action). A multistage process for expressing the concepts in user interfaces is presented. The chapter ends by discussing the strengths and limitations of the EDOS framework, comparing it with related work, and suggesting directions for further work.

INTRODUCTION

In Human Computer Interaction (HCI), Computer Supported Cooperative Work (CSCW), and Computer Supported Collaborative Learning (CSCL) theory-informed design has been influential in pioneering research projects, but remains under articulated. For instance, 'theory-informed' and 'theory-based' are not commonly used as adjectives to characterize user interface design. I wish to revitalize this line of research for contemporary interaction design because there are significant theoretical ideas implicit in many of the application systems we interact with today, and there is plenty of opportunity for more research in theory-informed interaction design (Mørch, 2009).
Three examples will motivate the topic. Affordance (Gibson, 1977; Norman, 1988), awareness (Polanyi, 1966; Dourish & Bly, 1992), and scaffolding (Vygotsky, 1978; Wood, Bruner & Ross, 1976) are three concepts with a long history in psychology, philosophy, and education, respectively. In spite of a lack of direct connection between these concepts and computer applications, they have had a big influence on interaction design in the above fields.

Gibson (1977) defined affordances as all “action possibilities” latent in objects in the environment. They are inherently “multifunctional” and independent of the individual’s ability to recognize them. In order to be used, the objects are configured for specific situations by revealing a subset of their affordances. For instance, a chair in a winter cottage might be used to sit on, stand on to reach items on the wall, or as fire wood when it is cold and there is shortage of dry wood in the vicinity. The usage is determined jointly by the specific situation and the user’s actions. Norman (1988) adopted the affordance concept to explain key features of human-computer interaction to refer to just those action possibilities that are readily perceivable by a user. His interpretation has been widely adopted by interaction designers. It makes the concept dependent not only on the physical features of the objects and the perceptive and reactive capabilities of users, but also on their cognitive capabilities: goals, plans, values, beliefs, memories, and past experience.

Awareness is another concept related to human-tool interaction that has attracted great interest in CSCW and CSCL. Polanyi first popularized the concept by proposing a distinction between focal and subsidiary awareness (Polanyi, 1966). In our focal awareness, we are aware of the objects of our attention. In our subsidiary awareness, we implicitly attend to the different parts and memories of past attempts to achieve the object. Polanyi used a hammer as an example. When driving a nail, we attend to both the nail and the hammer, but in a different way. The focus of attention is on driving the nail. At the same time, we have a subsidiary (bodily) awareness of the feeling of driving a nail in the palm of the hand. According to Polanyi, focal and subsidiary dimensions of awareness are complementary and belong together (Polanyi, 1966).

In CSCW and CSCL, the term awareness was first proposed to characterize features of collaborative environments that can automatically capture and dynamically update information about the actions of users in the environment and present it back to them in various ways (Bødker & Christiansen, 2006) and at different levels of abstraction (Ogata, Matsuura & Yano, 2007). Dourish and Bly (1992) defined awareness in collaborative environments as the understanding of the activities of others, which provides a context for our own activity. This ranges from detailed information of others’ actions in the user interface to higher-level representations associated with broader issues that may influence one’s activities like weather forecasts and traffic patterns (Cadiz et al, 2002), and at a more general level common understanding about a social, scientific, or political issue like ‘multicultural awareness.’ The former type of awareness is referred to as social awareness (Bødker & Christiansen, 2006), whereas the latter is referred to as conceptual awareness (Mørch et al., 2005). Conceptual awareness is more that the sum of individual actions and activities by adding a layer of generalization. As such it provides both a context and a goal for the activity. The two types of awareness are thus complementary and build on separate aspects of Polanyi’s notion of awareness. Social awareness is subsidiary, whereas conceptual awareness is focal.

Vygotsky (1978) developed a concept of how children develop and learn in the context of interacting with more capable persons. His idea is that the potential for cognitive development is limited to certain stages of development, which he characterized as the Zone of Proximal Development (ZPD). This refers to the gap between what a given child can achieve alone, independent