# Chapter XXIV
# Applied Pragmatism and Interaction Design

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## ABSTRACT

*This chapter presents a translational approach to socio-technical design, as a new approach to the theory-based design of user interfaces, supported by a multi-stage process. A survey of the early work on theory-based design in HCI identifies the strengths and limitations of this approach. This new approach extends HCI with a socio-cultural perspective, and adopts creative practices from the fields of architecture and furniture design. The process consists of three stages: selection, appropriation, and translation that "map" elements from the socio-cultural domain to the HCI domain. Two interactive systems are used to illustrate the process, informed by ideas of American pragmatism. The chapter ends by discussing the strengths and limitations of the translational approach, and points out directions for further work.*

*The "Copy Principle" accounts for the origin of all ideas.*

—David Hume

*Which is why "originary" must be understood as having been crossed out.*

—Jacques Derrida

## INTRODUCTION

In the fields of Human Computer Interaction (HCI) and Computer Supported Collaborative Learning (CSCL), theory-informed design has been influential but under-articulated. Two examples will illustrate the intimate connection between theoretical ideas and interaction design to argue for the importance of further research on theory-informed design. *Affordance* (Gibson, 1977; Norman, 1988) and *scaffolding* (Vygotsky, 1978; Wood, Bruner & Ross, 1976) are two ideas that have developed over a long time in psychology and education respectively, starting before computer applications become fashionable. In spite of a lack of direct connection between these ideas and computer applications, they have had an enormous influence on the design of human-computer interfaces in HCI and CSCL. However, there have been few attempts to map these two domains in terms of a multistage design process. Previous attempts at theory-based design of user interfaces took a different direction (e.g. Card, Moran & Newell, 1983; Polson & Lewis, 1990), which I return to later in this chapter.

Gibson (1977) defined affordances as all "action possibilities" latent in objects in the environment. They are independent of the individual's ability to recognize them and can be "objectively" measured. In order to be useful for interaction with users, the objects provide a subset of their affordances each time they are used. This is a result of different users interacting differently with the environment. For instance, a chair in a winter cottage might be used to sit on, to stand on to reach items on the wall, or as firewood when it is cold and there is shortage of dry wood in the vicinity. Norman (1988) appropriated the term "affordances" in the context of HCI to refer to just those action possibilities that are readily perceivable by a user (i.e., having a relational rather than dualistic meaning). It is Norman's adaptation that has been adopted by interaction designers. This is probably as a result of his emphasis on the cognitive capabilities of the user, which is the dominant perspective in HCI. 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 goals, plans, values, beliefs, memories, and past experience.

Vygotsky developed a theory of how children learn and develop 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 calls the Zone of Proximal Development (ZPD). This refers to the gap between what a given child can achieve alone—i.e., their potential development as determined by independent problem solving—and what they can achieve through problem solving under adult guidance or in collaboration with more capable peers (Vygotsky, 1978).

Several authors have pointed out the connection between the notion of scaffolding and Vygotsky's ZPD concept. It was Wood, Bruner and Ross (1976) who first coined the term "scaffolding" to describe the tutorial interaction between an adult and a child. The term was used as a metaphor to explore the nature of the support provided by an adult for children learning how to carry out a task they cannot perform alone. A result of this was a method for effective tutoring in terms of instructional techniques aimed at engaging and keeping the learner on task—for instance, to reduce the degree of freedom when the design space is large, provide direction towards a solution, highlight critical features, and give examples and demonstrations of partial solutions (Wood, Bruner & Ross, 1976). This approach has stimulated the design of computational scaffolds for educational technology, ranging from intelligent tutoring systems to web-based learning environments.

A goal of this chapter is to harness the under-articulated process of theory-informed interaction design, and to incorporate this as part of the first version of a process model of *socio-technical interaction design* (STID). Academically, this is situated in the intersection of HCI and the socio-cultural approach to research (Wertsch, 1991), thus extending the previous work in theory-informed design in HCI through a broader theory domain (social sciences rather than cognitive sciences). The

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