

**Metaphors for the Nature of Human-Computer
Interaction in an Empowering Environment:
Interaction Style Influences the Manner of
Human Accomplishment**

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Metaphors for the Nature of Human-Computer Interaction in an Empowering Environment: Interaction Style Influences the Manner of Human Accomplishment

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Abstract—Over the past four decades, the computer's role in helping humans solve information problems has increased steadily. New genres of computer applications have arisen, leading to new ways of using computers. Of these, perhaps the most advanced are what we shall call *empowering environments* for problem solving with computers. We propose that a closed-loop model of interaction provides a more natural, more accurate description of problem solving within empowering environments. Further we suggest that human accomplishment is strongly enhanced by *engagement* of the user in such environments, and a key to engagement is the power of an interface as an *illusion*, representing the real-world problem-solving situation directly to the user. In turn, the illusion is supported by *directness*, which depends on appropriate and timely *feedback* closely coupled to the user actions as part of *inter-referential input/output*.

For most computer users, an interaction style called *direct manipulation* has been found to provide the most empowering environment. By exploring three powerful metaphors for the nature of human-computer interaction—use of a tool, artistic imitation, and existence in a model world—this article will probe beyond measurable human factors in elucidating the nature of the influence of interaction style upon the computer user's manner of approach to problem solving. In particular, by focusing on concepts such as engagement, illusion, and directness, we explore reasons why the direct manipulation style supports a closed-loop problem-solving process.

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