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**Preschool Children at the Interface:
A Cognitive Model of Device Difficulty**

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Cognitive modeling is a method by which data on human performance is quantified and interpreted. In the field of human-computer interaction, cognitive models provide theoretical constructs that attempt to identify the mental processing required to perform a given class of computer tasks, and which try to provide explanations for variations in performance across users and across tasks. Many different types of models exist in the current human-computer literature (c.f. Booth, 1989; Olson and Olson, 1990), and have been successfully applied to a range of computer-based tasks, such as word-processing or automatic-teller usage. It is often argued that this type of modeling provides the most profitable way to assess and predict human performance with the computer, and allows the most penetrating insight into the factors that govern effective human-computer interaction.

While cognitive modeling has been a useful technique for characterizing adult computer use, the suitability of this method for understanding the performance of young children is limited. The basic problem is that for such models to have any predictive value, they must assume generally error-free, on-task performance by the computer user, and that the user's performance is always directed toward solving a clearly defined goal (Booth, 1989; Olson and Olson, 1990). Casual use, where there is no clear goal, or use behavior that is filled with errors or digressions, is not well-captured by cognitive models. Unfortunately, such behavior is typical of preschool children, and thus would appear to make cognitive modeling unsuitable for understanding the performance of such children when using a computer.

The present paper takes the position that cognitive modeling can still be a useful strategy for organizing data on children's performance with computers if the domain being studied is appropriately defined. The current model is concerned with the narrow domain of interface devices for cursor control, and their demands on young children as computer users. The purpose of the model is to provide an initial explanation for the results of several studies of children's use of a variety of different input devices, conducted in the past five years at Children's Television Workshop. This explanation should be regarded as provisional; future studies will attempt to refine the hypotheses presented here.

