

Young Children's Comprehension of a Novel Interface: How Cognitive Development and Previous Computer Experience Come Into Play

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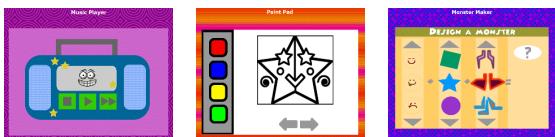
Introduction

Cognitive development theory suggests that young children go through a concrete thinking stage, in which they cannot perceive certain abstract concepts, and understand them (Piaget, 1970). However, in recent years, a growing population of toddlers and young children has been actively using computers; nearly half (48%) of children six and under have used a computer, 30% have played video games (Kaiser Family Foundation, 2003). While the Human Computer Interaction (HCI) community continues to struggle with creating an easy visual metaphor for computer interfaces, the ones currently available are complex and highly abstract. How, if then, do young children use computers so frequently? Can they comprehend the visual metaphors presented to them? Or is this 'trained' behavior? This study looks at this question, by examining the relationship between three factors: cognitive development, computer experience, and the ability to comprehend novel interfaces.

Method

39 children ages 3-6 from two schools in Harlem, were given 25 minutes to play three novel computer games, varying in levels of complexity and familiarity. The research design combined standard usability testing protocol and clinical interviewing, then transformed into quantitative data. Information about the participants' previous computer experience has been collected as well as their age. The sessions were recorded using Morae software, which combines a video/audio of the participants' face during the session with the computer screen and clicks.

Figure 1: the 3 Novel interfaces used.



Music Player (MP) Paint Pad (PP) Monster Maker (MM)

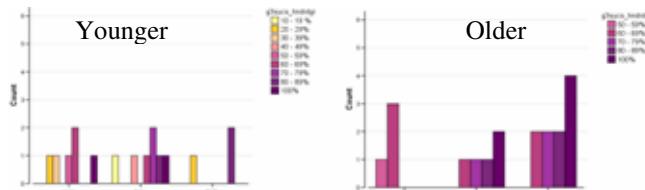
Results

Since there weren't enough subjects for multivariate analysis, Crosstabs analysis was performed on all sets of

variables. In order to see the effect of age on both experience and success, we divided the participants into two equal age groups: Younger (3-4.5) and Older (4.5-6).

An interaction pattern was found when comparing success and experience between the different age groups, and between the three games. Amongst the younger age group computer experience had little effect on their ability to learn novel interfaces on their own. However, in the 'older' age group the more experienced users had a substantially easier time learning how to use novel interfaces than the less experienced computer users. In the simpler game there were no apparent differences between the age groups, probably due to a ceiling effect. In the harder game the interaction pattern emerges, and in the hardest game it is clear (see graph 1).

Graph 1: age differences in Game 3.



References

Andersen, J. (2000). *Cognitive Psychology and its Implications*. New York: Worth Publishers and W.H. Freeman.

Black, J. B. (1992). *Types of Knowledge Representation* (CCT Report No. 92-3). New York: Teachers College, Columbia University

Bruckman, A., Bandlow, A. (2002) "HCI For Children." In *Handbook of Human-Computer Interaction*. Edited by Julie Jacko and Andrew Sears. NJ: Lawrence Erlbaum Associates.

Ginsburg, H. (1997). *Entering The Child's Mind*. Cambridge: Cambridge University Press.

Hanna, L., Risden, K., & Alexander, K. (1997). Guidelines for Usability Testing with Children. *Interactions*, 4(5), 9-14.

Kaiser Family Foundation. (2003) *Zero to Six: Electronic Media in the Lives of Infants, Toddlers and Preschoolers*, Menlo Park, CA: Kaiser Family Foundation,

Piaget, J. (1976). *Introduction: the child's conception of the world*. Totowa: Littlefield, Adams.