Mommy! Which one should I choose?
Exploring the Design of Dialog Boxes for Children

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ABSTRACT

This paper reports findings of an observational field study conducted with 111 children aged 3 to 12 in a science center for exploring how age-specific and usable dialog boxes can be designed to facilitate children's interaction with a computer. We identified challenges faced by the children when they interacted with dialog boxes: causality, purpose, hindrance, communication, consequence, and patience. We then propose design solutions for addressing these challenges.

Keywords: Child-computer interaction, dialog, design.

Index Terms: [Human-Centered Computer]: Field Studies

1 INTRODUCTION

Dialog boxes are interface elements that are crucial for the exchange of information between the user and the computer. They present information that demands users' attention to act upon given choices. These choices often lead to different outcomes including disruptive consequences like file deletion. However, there is a paucity of research on designing dialog boxes.

Our research aimed at designing age-specific usable interfaces, in particular dialog boxes, for children. The number of children using computer has tripled in the last decade and the age at which children started to use a computer has become younger [9]. Yet, many children use computers without guidance because more parents are using computer time as free babysitting [1]. Children, especially those under 10, have a strong desire to perform well and accomplish tasks on their own [7] and this sense of mastery is very important for a child from a developmental perspective [3]. Therefore age-specific and usable interfaces would be valuable for children to gain autonomy.

However, the design of current computer software for children including dialog boxes often do not take into account the age differences of children in their physical, cognitive, affective, and other abilities [7] although age has been identified to be an important factor in design [2]. In fact, designing usable dialog boxes for children is likely more challenging as children constitute a moving target in terms of their capabilities [4]. We are thus motivated to explore how dialog boxes should be designed to meet the different needs of children at different ages so that they can interact with a computer independently. To our knowledge, there has been no other research on designing dialog boxes for children. We thus expect that our research will contribute towards filling this gap.

We conducted an observational study with children in a public space to explore their interaction with dialog boxes. This paper reports our preliminary findings. We identified a taxonomy of challenges faced by children when interacting with computer dialogs. We then proposed design solutions for dialog interfaces for addressing the identified challenges.

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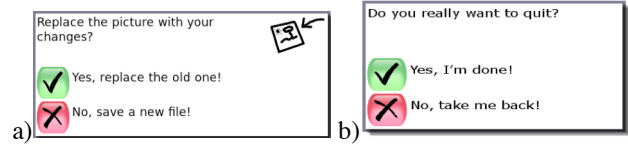
Figure 1. Original dialog boxes in TuxPaint (a) Save (b) Quit.

2 METHODOLOGY

Five days of exploratory observations were conducted with 111 children aged 3 to 12 in a science center in North America, where a variety of scientific shows, exhibits, and events are available for children to explore and experience for fun and learning. Our initial goal was to broadly explore children's interaction with computer interfaces. However we shifted to focus on children's interaction with dialog boxes from the second day when we realized that dialogs were surprisingly problematic to the children.

A painting program Tux Paint [10] was used in our study because it was specifically designed for children. It is also one of the most popular free, open-source programs used in schools. Tux Paint was running simultaneously on two computer stations and a recruitment poster was placed nearby. With informed consent of the adult chaperones, the children used Tux Paint to create their own drawing. The children could leave at any time. Each study session lasted an average of 12 minutes. The children were offered a Tux Paint sticker and a color print-out of their drawing at the end of their study session. Our observations were recorded in paper. "Eureka" moments such as when the children were surprised by unexpected onset of dialog boxes were captured.

Grounded theory was used to analyse the collected data by first sorting them into different categories with respective to three age groups (see below). We particularly focused on the challenges faced by the children, which were grouped thematically. With reference to documented design principles, we brainstormed design solutions for addressing the identified challenges. Experienced HCI researchers then iteratively evaluated the design solutions: paper prototypes of dialogs illustrating the design solutions were first created to gather feedback and the resulting refined set of designs was then prototyped in Tux Paint dialogs for follow-up evaluations.

3 FINDINGS

The children in our study were categorized into *pre-readers* (ages 3-5), *semi-readers* (ages 6-7), and *readers* (ages 8-12) to reflect their demonstrated behaviors including their reading ability of computer dialogs during our study and their general literacy according to developmental psychology literature [7]. The children while interacting with computer dialogs were found to encounter a variety of challenges: *causality*, *purpose*, *hindrance*, *communication*, *consequence*, and *patience*. These challenges affected children of different ages in varying degrees. Pre-readers were affected mostly by problems related to causality, purpose, hindrance, and communication, semi-readers by consequence and to some extent communication and patience, and readers primarily by patience. Table 1 presents these challenges and the affected age groups, as well as our proposed design solutions for addressing these challenges, except hindrance. Next, we briefly

Table 1: A taxonomy of challenges faced by the children (* to less extent) when interacting with dialog boxes and their respective design solutions

CHALLENGES	DESCRIPTIONS	AFFECTING	DESIGN SOLUTIONS
Causality - *How did it appear all of a sudden?*	The children had difficulty in making the link between their action and the resultant dialog.	Pre-readers	**Call out dialogs** -Resemble a comic book style call-out
Purpose - *Why is it here?*	The children did not understand that the software was trying to have a conversation with them, that is, providing them with some information and asking them to make a choice.		**Split dialogs** - Place question and choices in separate dialogs
Hindrance - *Why is it in my way?*	The children had difficulty understanding the modal nature of a dialog box as to why they cannot continue interacting with the software.		
Consequence - *What should I do now?*	The children did not understand the full implications of their choices and did not know how to deal with negative consequences resulted from their choice. They were found to prefer "green" choices or the first option (Figure 1). Yet the consequences of which were often surprising to them.	Semi-readers	**Progressive disclosure of buttons** - Make safer choice to appear first **A safe button** - Add a "I don't know" button **Color coding** - Use colors to signal consequence: green for safe choice, orange and red for riskier choices **Highlighting** - Highlight safe choice
Communication - *What is it saying?*	The children had difficulty understanding the message communicated through the dialogs, mainly because they were not able to read the text on the dialog and/or not able to understand the underlying abstractions.	Pre-readers *Semi-readers	**Title text** - Add a clear title that summarizes the purpose of the dialog **Title icon** - Add a descriptive icon to the title **Button icon** - Add a descriptive icon to each button
Patience - *Whatever…*	The children just wanted to get rid of the dialogs, i.e., they did not want to spend time in reading and understanding the message.	Readers *Semi-readers	**Body text contrast** - Display body text in different contrasts

describe our design rationale, and several design solutions aided by snapshots of our dialog prototypes on Tux Paint.

Our design rationales aim to draw attention through the use of various contextual cues and to support *satisficing* (i.e., choosing the first reasonable option without considering all the options) [6], default choices [5], and scanning lengthy documents [8]. We intentionally do not provide audio support in our design solutions even though speech appears to be obvious and easiest for addressing the literacy issue, partly because noise can be an issue in public or group settings and partly because sound may be used for other purposes.

Call-out dialogs to address causality. Current dialog boxes in Tux Paint and most other software do not clearly indicate a link between the user's action and the resulting dialog. For example, a Save dialog that pops up when a child clicks the *Save* button may not be obvious to the child that it is linked to the clicking action.

Split dialogs to address purpose. This design (Figure 2a) aims to help children especially the pre-readers to picture themselves communicating with the computer through the split dialogs.

"Safe" features to improve communication and consequence. As most pre-readers cannot read yet, our design solutions focus on the use of non-textual visual cues to facilitate the information processing particularly by pre-readers so that these young children can dialog with the computer more independently. In most cases, we make use of visual cues to help guide the children to pick a *safe* button in situations when they do not completely understand

the choices. For example, buttons are color-coded (Figure 2c+d) that follows the conventional semantics of color – red represents danger and green represents safety.

Supporting skimming to improve patience. Readers exhibited reduced patience relative to the younger children in our study and surprisingly, they were also less inclined to read text. We thus propose to redesign dialogs to help them process information more efficiently by supporting scanning for keywords or icons when processing the dialog information. Thus dialogs can be designed by manipulating the title text, title icon, body text, button text, and button icons. For example, dialogs with body text displayed in different contrasts similar to Figure 2b may help readers to skim dialog contents.

4 CONCLUSION AND FUTURE WORK

Our field study explored the design space for dialogs for improving children's independent interaction with dialogs. We identified challenges of causality, purpose, hindrance, communication, consequence, and patience faced by pre-readers (3-5), semi-readers (6-7), and readers (8-12) in varying degrees. We then proposed and prototyped design solutions for addressing the identified challenges. Our next step is to iterate prototyping and to evaluate how our proposed design solutions may impact children's interaction with computer dialogs, and if and how our dialog designs can be applied to other children's software.

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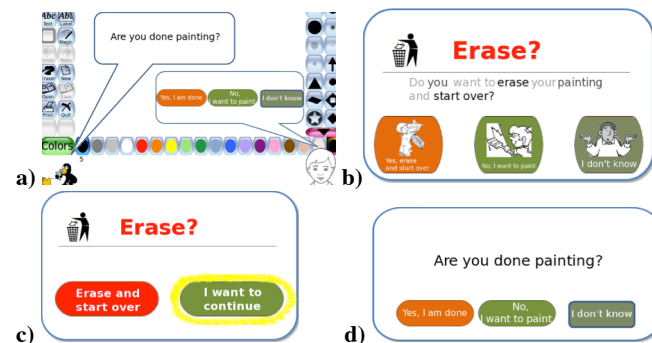[10] Tuxpaint. http://tuxpaint.org/ Retrieved March 2011.

Figure 2. Redesigned Tux-Paint dialogs (a) split dialogs - question dialog from the mascot icon (bottom left) and choice dialog from the user icon (bottom right) (b) body text contrasts (c) color coded buttons and highlighting of the safe button (d) additional safe button (bottom right)