Experimental Design

Examining the spoken language of preschoolers interacting with a machine is a complex and obstacle ridden task. Due to the inherently unpredictable nature of preschool aged children and the many obstacles that they present as test subjects, any sort of traditional experimental design is insufficient. However, we successfully designed a preschool-children-specific experiment that runs smoothly and easily and provides solid data without the threat of the multiple variables and inconsistencies normally associated with such studies.

The experiment utilizes a "Wizard of Oz" format in which children engage in a conversation and play a series of basic task completion games with an animated on-screen agent. But although the children believe that they are working with a piece of software, they are in fact just interacting with the investigator (the wizard) who is located at another terminal, carefully manipulating the computer agent and conducting the games. This makes it appear as though the child is speaking with and giving commands to the computer and facilitates a natural child-computer agent interaction. This interaction and the transcripts of this interaction will allow us to extract the data that we desire.

Procedure

After completing all necessary paper work, the investigator leads the child and parent into the testing room. This room is relatively empty and contains only a couch designated for the parent of the child, two chairs, a desk, and a computer monitor that sits on top of the desk. A one-way mirror connects this room to the adjacent room that serves as the control center and viewing area for the investigators. The parent is instructed to sit on the couch while the child and investigator sit at the computer.

The investigator asks the child a brief series of open-ended questions that illicit a sampling of the child's natural, person-to-person behavior. The investigator then introduces the on-screen agent and begins to play one of the games, demonstrating how the games should be played and showing the child that the computer responds to voice commands. After this demonstration, the investigator suggests that the child interacts with the machine. The investigator sits out of the way and makes sure that the child is properly positioned in front of the screen. When everything is set, the agent welcomes the child and begins a conversation based on a set of questions similar to those asked by the investigator. After the conversation section, the agent leads the child into the game section. The child works through the various exercises until all are completed. The agent thanks the child for playing and then says goodbye. Before the child leaves, the investigator asks a series of debriefing questions regarding the child's experience with the computer and agent.

Setup

- The realistically animated on-screen agent is a teenager named "Josh". In the preparatory stages of the study, short video clips of the agent were created that depict him asking questions, giving encouragement, and making other statements that could potentially arise in the conversations with the child. The wizard simply cues these video clips whenever appropriate during the interaction using a java based media player designed especially for this experiment. Through this

process, the wizard can manipulate the agent so that it appears to the child that "Josh" is actually responding and commenting in real time.

- The pattern completion, "odd one out", and various sorting games that the investigator and child work through were designed specifically for this experiment. They are all consequence-free, preschool level task completion exercises created in Macromedia director.
- All of the software runs on a single system that is located in the control room. The system that the child interacts with is actually just a second monitor stemming from the control system. The child views and reacts to the events that are put on screen and the wizard manipulates the software accordingly.
- The audio of the experiment is recorded by a set of microphones and stored on the computer. A camcorder that is mounted above the mirror records a frontal view of the child while the on-screen events are recorded onto a separate video.