Embedding Focused Interests Into Computer-Mediated Autism Interventions

Background: Individuals diagnosed with autism spectrum disorder (ASD) often have intense, focused interests. These interests, when harnessed properly, can help motivate an individual to persist in a task that might otherwise be too challenging or bothersome. For example, past research has shown that embedding focused interests into educational curricula can increase task adherence and task performance in individuals with ASD. However, providing this degree of customization is often time-consuming and costly and, in the case of computer-mediated interventions, high-level computer-programming skills are often required. New technologies that automatically embed focused interests into interventions are sorely needed.

Objectives: Our goal is to create an open-source algorithm that automatically uploads user-specified content into an online intervention for individuals with ASD. To explore this approach in a natural setting, we evaluated components of our technology in a user study with six adolescents on the autism spectrum.

Methods: In our algorithm, users enter a description of a focused interest into a query box, and the results of a Google image search are returned. Our search method filters the images, eliminating pictures that are too small, large, or oblong to be resized properly. The remaining images are automatically resized and presented to the user as tiles in a new window. The user can then select which images s/he would like to see incorporated into the software. Additionally, our method removes the background of some of the returned images, so that they can be more elegantly embedded into certain computer programs. Two females and four males on the autism spectrum participated in game-play sessions to test this technology. Two different games were created, and two versions of each game were presented (one with customizable content, and one without). After playing each game for two minutes, each child was given a choice to play any of the four games. They were shown tiled depictions of the four games and were told to point to the game they wanted to play next. All of the game content was selected before the experiment, and was based on the suggestions of each child's teacher. This was done because some of the children had limited verbal abilities and might not have been able to tell us about their preferred interests, and because we wanted to prepare our tiled depictions of the games in advance.

Results: Five of the six children chose to play one of the customizable games during the free-choice session. The child who did not choose one of the customizable games kept requesting another cartoon character instead. Without our prompting, she navigated to the query box in our game and began to type in the name of this character. We helped her update the game according to her preference, and then she played it quite happily.

Conclusions: Our algorithm was robust and was able to embed customizable content into each game. The study also highlights the value of customizable content that can be updated and altered at any time, especially at the request of the user.