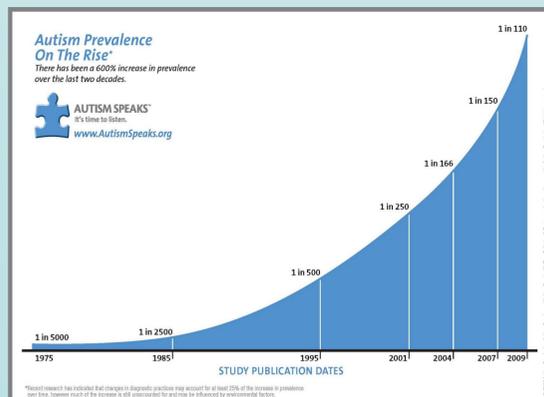


Abstract

Smartphone apps are used with increased frequency to teach children. In particular, children with autism could benefit from applications suited to help them overcome social challenges. In our research, we first investigated and compiled a list of existing apps to see where gaps exist in topic coverage. From this survey of existing smartphone apps for children with autism, we developed a new app that challenges children to interact in a social setting by responding to emotional cues, and having other children guess their emotions. This app provides a new context to help children learn about their emotions through peer interaction.

Autism: The Facts

- According to the Centers for Disease Control and Prevention, autism spectrum disorders are developmental disabilities causing significant behavioral, social, and communicative disabilities.
- An average of 1 in 110 children in the United States have an Autism Spectrum Disorder.
- More children will be diagnosed with autism this year than with childhood cancer, juvenile diabetes or pediatric AIDS combined.
- Children with autism may:
 - Avoid eye contact and want to be alone
 - Have trouble understanding other people's feelings or talking about their own feelings
 - Have delayed speech and language skills
- As seen in the chart below (from Autism Speaks), the prevalence of Autism is growing at an astounding rate. This makes our research particularly relevant to the increasing need for providing for this group of people. We believe that our app will contribute to a better quality of social interactions for the increasing amount of children on the spectrum.



Improving Socialization and Emotion Recognition for Autistic Children Using a Smartphone App

Cassidy Lamm and Lauren Lambert
(Mentors: Dr. Jeff Gray and Dr. Angela Barber)

Gap for New App

There are many apps on the market that are designed for children with autism. However, through our research of already existing apps and our compilation of those that specifically addressed social issues, we found a lack of applications that dealt with the social obstacles faced by children with autism. Although there are some social apps, many of these are “social stories” and not interactive. There is a lack of applications that help children to learn about social interactions in a fun and challenging way.

After identifying a need for facilitating actual practice of emotions and real social interaction with other individuals, we undertook the challenge of designing an application that would facilitate social growth. In order to help inspire children to practice these emotions in a real-life setting, we formulated a design for an app that has the potential to be utilized in a group.

Instead of only having children learn what picture corresponds to which emotion word, this app will initiate social interaction. The child will have practice in both expressing the emotion assigned to them, and guessing the emotions that other children will be asked to express.

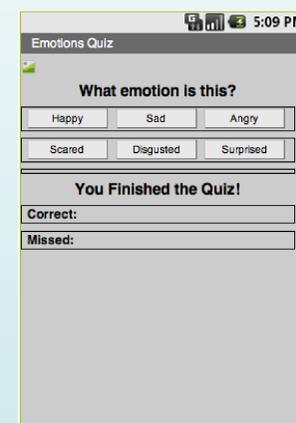
Three Stages of Socialization

After we found the gap in social apps already on the market, we decided to focus on six different emotions commonly expressed in everyday life (Happy, Sad, Angry, Scared, Disgusted, and Surprised). In order to maximize learning and social skills, the app will consist of three separate phases using the six different emotions. The recognition phase of the app will iterate through each image of the six emotions and pair it with its emotion word (i.e. “Happy”) for the child to learn the correct pairings. The quiz phase of the app displays each of the six images at random and prompts the child to press the button that matches the emotion displayed. While the child is playing, the game will keep score of how many the child got right or wrong and display it at the end of the quiz. The charade phase, the third and final phase, will allow one user to act out an emotion while the other participants try to guess which emotion he or she is displaying. This stage will encourage social interaction among other children using what the child has learned thus far in the app.

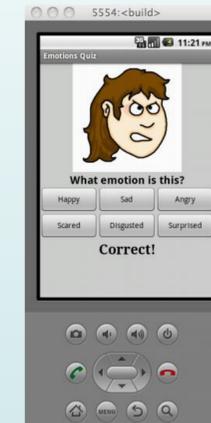
Creating The App

Through the use of MIT's App Inventor, it is possible to develop relatively complex Android apps without advanced knowledge of programming. Using App Inventor's interface, we designed the app's GUI with the basic components (e.g., the title, labels, buttons, and the image of the emotions). Then, using the blocks editor, we were able to build the behavior of the app for each requirement. For the quiz phase, we began by creating variables to keep track of the score, the current picture, and the number of questions left in the quiz.

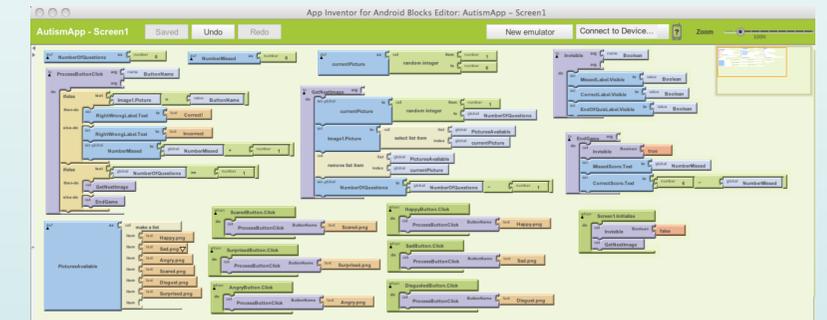
After making a list of all the pictures, we then created two procedures. The first procedure retrieved the next image by setting the current picture to random, removing the previous picture from the list so it is not viewed again, and decrementing the number of questions by one. The second procedure was created to process whenever a button was clicked by first comparing the button pressed to the image to see if it matched the image. If it was a match, a “Correct” message appeared and if it did not match an “Incorrect” message appeared. An incorrect answer also increased the missed variable by one. When the number of questions is equal to zero, the quiz ends and the user is shown their score. Though this phase is in an initial draft stage, we hope to build a prototype of the complete app and test its actual helpfulness in improving the social skills of those in our target ages.



GUI Interface



Android Emulator



Blocks Editor

Lessons Learned and Future Work

Though our research is not yet complete, we have already improved upon original ideas. In order to get the most involvement and social interaction, our idea for a social app for children has grown to include a teacher or facilitator to maintain order. At the same time, however, the app will still keep score, keeping it a fun and challenging game.

Currently, we have a beta phase of the quiz game that is functional. In the future, the other two phases of the app will be integrated for a greater social learning outcome. The children's phones will, in the future, communicate through a database to collectively run the charades portion and to keep score. The facilitator will have a separate application that will hold the instructions for the smooth operation of the charades game. The facilitator's phone will also be able to access this database in order to see the scores and track the children's progress.

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