



# Read-with-Me Sesame: Android Application Using Speech Recognition to Improve Literacy

Kyla Dolan, Whitney Aaronson • Advisor: Matthew Kam • 05-438 The Role of Technology in Learning in the 21st Century, Spring 2012

## Unmet Need:

In the United States, 43% of children are not being read to by their parents. The rate of both parents working has been increasing, leaving less time for parents to read to their children. Currently, 58% of families with children under 18 years old, have both parents working.<sup>[1]</sup> However, studies show that children whose parents read to them nightly are more likely to recognize the alphabet, a basic pre-reading fundamental. Additionally, only 52% of children between the ages 3-5 are enrolled in preschool or kindergarten programs.<sup>[2]</sup>

Parent/child interaction is necessary to help foster learning, especially literacy, beginning at an early age.

## Problem Statement:

There are many difficulties children face when learning to read. One of the most common problems is decoding, or the ability to understand connection between written and spoken words. Children who have improved decoding skills also show significant improvement in word comprehension. In order to combat word comprehension challenges down the road, the focus of this application is to improve decoding skills early on.

## Learner Profile:

The learner profile this application is targeting is pre-elementary school children (4-6 year olds). These children should have basic phonetic decoding skills, or at least a basic knowledge of the English alphabet.

## Solution Overview:

This application uses the Android speech recognition API along with Sesame Street stories to help children ages 4-6 improve their reading abilities. By using speech recognition, this game can detect if a child is pronouncing a word correctly. While this idea is similar to the Carnegie Mellon project LISTEN, it uses a mobile platform and a game interface to help foster parent-child interaction at home.<sup>[4]</sup>

Since this application will cause more children to be read to and more children to practice reading, it will improve the literacy rates in children.

## Usage:

Initially, the parent will play the game with their child. The parent will be there to help explain to the child how to play the game as well as to help provide additional guidance on how to read and pronounce the words.

## Device:

This game is an Android application that uses speech recognition to improve children's literacy. The current platform this prototype is being run on is the Motorola Droid. Future iterations of the game will look towards Android tablets due to their larger screen size.

## Personalization and Game Design:

This game is made up of three stages: Read-to-Me, Practice Reading, and Play a Game.

In the beginning of the application, the user will be prompted to choose a Sesame Street character for the game. This allows for the children to pick their favorite character to help them learn to read.



Figure 1. Opening Screen of Reading Application

## Stage 1: Read-to-Me:

The first part of the game is the "Read To Me" section where the child is read a story. As each word is read, the word will be highlighted. This helps the child learn how to say each word of the story. The child has the options of clicking on each word to hear the word spoken allowed, or clicking the story button to hear the entire page read at once. Once the story is over, the child has the option to hear the story again or change to one of the other stages.



Figure 2. Screenshot from Read-to-Me Stage from the story "Cookie Monster Cleans Up"

## Design Rationale:

The design of the first stage of the game is modeled from the LeapFrog TAG system, which has been the number one reading system in America through the use of a pen reader.

By allowing the child to pick a character to guide them through the game, it provides him a sense of autonomy over how he will learn how to read. Additionally, it allows the child to go through the game multiple times with a different character to help them each time.

Furthermore, the game allows the child to pick the story he wants to read. This is another way the child can be autonomous. Additionally, by having a story read aloud, it provides the child a sense of purpose for why they should want to learn to read. The sense of purpose is further demonstrated in later stages of the game.

## Stage 2: Practice Reading:

In this stage, there are six words from the story displayed randomly on the screen. The child must click on the word and then say the word out loud. Using speech-recognition, the game will determine if the child properly pronounces each word. If the child gets the word correct it will disappear. Otherwise, the chosen character will say "Sorry, did you mean to say [insert word here]." This will happen if either the speech recognition made an error or if the child made an error.

The words are displayed over a picture. Once the child clears all the words, he/she gets to see the entire picture and can unlock the next stage.



Figure 3. Screenshot from Practice Stage with Words Uncovered

## Design Rationale:

There is a sense of mastery that can come through practice as demonstrated in this section of the game. The child will never experience a sense of failure since there is no way to "lose." The child will get an unlimited amount of tries in order to get the word right, so the game will always provide a sense of encouragement to the child. Furthermore, the feedback will be immediate, regardless of whether or not the child gets the word right/wrong to reinforce learning.

Additionally, there is a further sense of purpose for the child to complete this level. In order for the child to move onto the next stage, he must successfully read all the words covering the picture. Until that point, the Fluency Game will be locked.

## Future Work:

In addition to further designing this for an Android Tablet, we hope to improve the interface of speech recognition API. Additionally, later versions will include further parent/child controls including tracking the child's progress. Furthermore, the voices will be replaced by actual Sesame Street characters in later versions. Finally, there will be a wider selection of books the child can choose from that will be available for purchase within the application.

## Stage 3: Fluency Game:

The final stage works on fluency development and automaticity of decoding. Words float across the screen. The child must click on the word and say it similar to the practice reading level. The difference is that there is a time limit to get each word correct. This helps develop fluency since the child must decode each word faster.

As the levels in the game progress, so does the speed at which the words pass by. If the child gets six words wrong, the game ends the child sees their score and "good job." If the child stays in for the whole minute, the child sees their score and "you win."

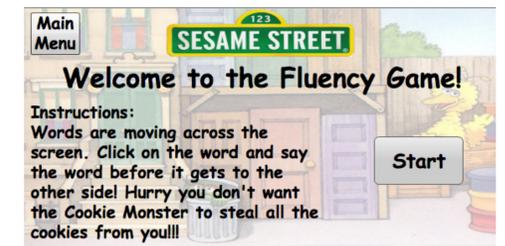


Figure 4. Game Instruction Splash Screen

## Design Rationale:

In this level, the application focuses not only on decoding but also automaticity. Because we are also testing automaticity, there is a time factor built in, which is why the words move across the screen. Additionally, the child can never lose in this game; he can win, or get a "good job" message, which is better for motivation.



Figure 5. Screenshot from Fluency Game

## References:

- [1] "Facts about Children's Literacy." National Education Association. 30 Apr 2012. <http://www.nea.org/grants/13662.htm>.
- [2] Lopez, Elias S., and Patricia de Cos. "Preschool and Childcare Enrollment in California." California Research Bureau, Jan 2004. 30 Apr 2012. <http://www.library.ca.gov/crb/04/03/04-003.pdf>.
- [3] "Project LISTEN." 23 Oct 2008. 30 Apr 2012. <http://www.cs.cmu.edu/~listen/>.