V-Braille Mobile iOS Braille Teaching Games

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Abstract

Braille is a major form of communication for people who are visually impaired. V-Braille has been developed as a way of presenting braille through the medium of mobile devices with touch-screen and vibration capabilities. The V-Braille games for iOS are designed to teach and reinforce braille comprehension by using V-Braille. Thus, they provide a readily available, easily accessible, and fun environment for the comprehension of the braille alphabet.

V-Braille

V-Braille uses touch screen and vibration capabilities to simulate tactile braille. Every braille character is composed of some combination of raised dots in a 3 by 2 grid (a total of 6 dots). The dots along the left column are referred to as dots 1, 2, and 3 (from top to bottom) and the dots along the right column are referred to as dots 4, 5, and 6. Thus, if someone wanted to explain how the letter 'e' was written in braille, they would say that the letter 'e' is composed of the dots 1 and 5. For V-Braille, the dots are arranged in the same 3 by 2 grid; however, the dots on the mobile devices cannot be raised like normal tactile braille. In order to tell the user that a braille dot is raised, the device vibrates. Furthermore, the phone dictates the number of the dot that the user's finger is over. Thus, a blind user would read the letter 'e' in V-Braille by moving their finger around and noticing that the device vibrates when their finger is over the first and fifth dots. Figure 1 shows how 'e' would be represented in V-Braille. The device would vibrate when the dots that are filled in are touched.

V-Braille Games

Purpose:

V-Braille offers a way of representing braille on touch-screen devices that maintains the general structure of braille letters but through an entirely differently medium. Thus, learning how to read braille dots on a touch-screen will not assist in learning how to read tactile braille. However, before someone can even try to start reading braille, they have to learn the alphabet, and V-Braille can be used to help teach the alphabet, because learning the alphabet simply involves memorizing the combination of dots that represent each letter. The V-Braille games for iOS consist of 3 games, which are designed to provide a simple and fun environment for braille alphabet comprehension

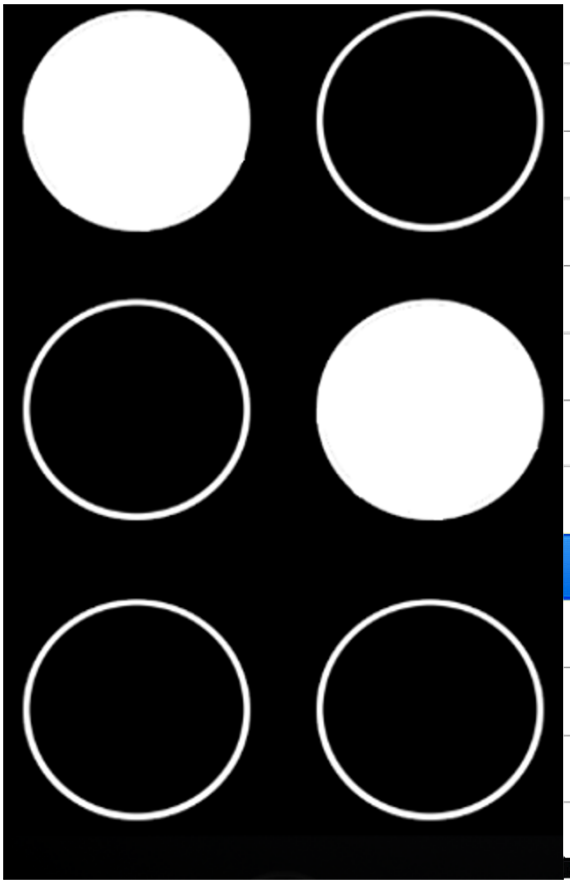

Figure 1:
V-Braille Notation for the letter e.

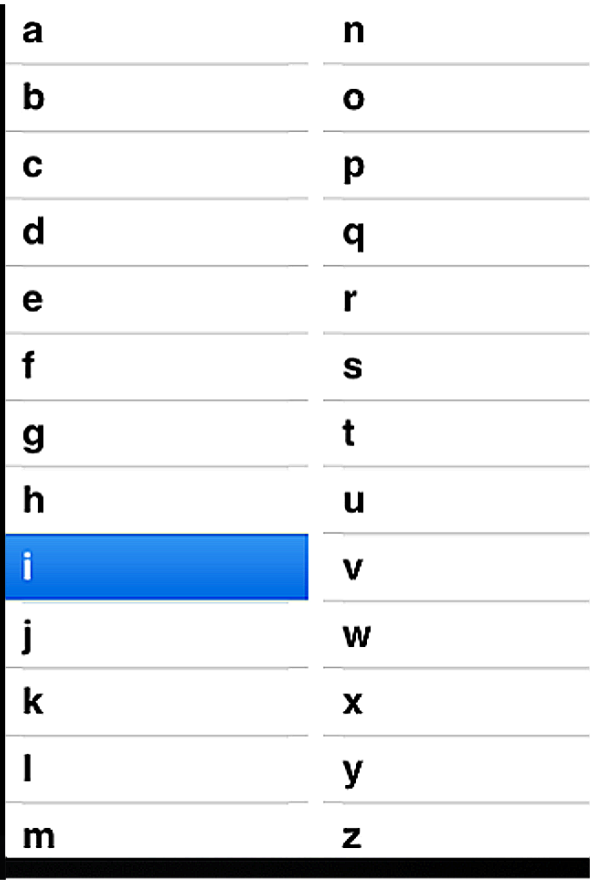

Figure 2:
Letter selection screen for VB Reader

VB Writer:

VB Writer consists of a single screen. The screen starts our as an empty V-Braille grid (like figure 1, but with no dots filled in). The iOS device dictates the instructions for the game and then prompts the user to enter a randomly selected letter. The user can select dots to be raised/flat (filled/unfilled) by double tapping the dots. Thus, if the letter to enter was 'e', the user would have to double tap the first dot and the fifth dot. The user submits their answer by to-finger swiping to the right. The device would then dictate whether the user entered the right letter and explain what letter they actually entered if they were wrong. The device would also state the new letter to enter and present a new V-Braille screen (no dots are filled in). The user can also two-finger swipe downward to here the instructions again or tap once with 3 fingers to here the letter to enter again.

VB Reader:

This game has 2 screens. The first of which is a V-Braille screen that has some random letter on it. Thus, the screen already has dots that are filled and the user cannot double-tap the dots to fill/unfill them. Rather, the user feels around the screen to find out which dots are raised (vibrate) and then two-finger swipes to the

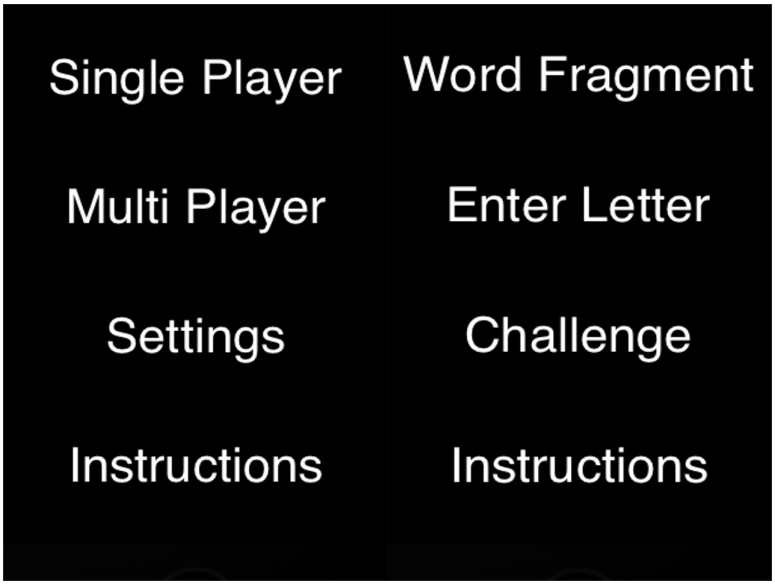

Figure 3:
VB Ghost main menu

Figure 4:
VB Ghost player menu

right to bring up letter selection menu (figure 2). In the letter selection menu, they can move their finger across the screen and the device will announce what letter their finger is over. Then, they can choose a letter by double-tapping. The double-tap will select the last letter that was spoken (not the letter that is double tapped). This allows blind users to tap anywhere after they here the letter they want to choose. After selecting the letter, the device tells the user whether the letter they chose was right or wrong and what the right letter was if they were wrong. The user will be returned to the initial screen, and a new random letter in V-Braille notation will be on the screen. The user can also two-finger swipe down to hear instructions.

VB Ghost:

VB Ghost has 5 screens. The first is the main menu (see figure 3) which has a single player, multi-player, settings and instructions button. The multi-player and single-player buttons both bring up the player menu (se figure 4). The settings button brings up an option to change the wordlist size. By default, the word list size is about 3000,000 words long, but the user can choose to use a smaller (children's) list of words that has about 10,0000 words. The word list is used to determine what words are valid. The instructions explain that ghost is played by adding letters to the end of a word fragment. The objective is to add letters such that the word fragment is not an English word, but is still the prefix of an English word. From the player menu, the player can select word fragment to here the letters that have been added to the fragment so far. They can also select enter leter which brings up a screen identical to the VB Writer scree, except the user is not prompted to enter any particular letter. Then, the user can select challenge is order to challenge the other player/computer. From the challenge menu, the users can select either invalid prefix or complete English word. Based on which challenge is selected, the device will make the appropriate check using the word list that has been selected. If the

user challenges and is wrong, then the user loses otherwise the opponent loses. In either case, the app returns to the main menu screen. For single-player, every other turn, the device will first check to make sure the player hasn't lost by adding a letter that causes the fragment to be an English word or no longer be the prefix of any English word. If the player has lost, the device notifies the player that they have lost and explains why they lost, and then returns to the main menu. Otherwise, the device picks a letter to add to the fragment. The device looks at all of the words that have the word fragment as a prefix, and then either picks the next letter from one of those words (80% of the time) or adds a random letter (20% of the time). The chance of adding a random letter was added to make it easier to beat the computer player. Note, that when a letter is chosen from a word, it is possible that the computer will inadvertently form a complete word. For example, the current fragment could be 'ghos' and then computer selects the word 'ghost' and adds the next letter, t, to the fragment.