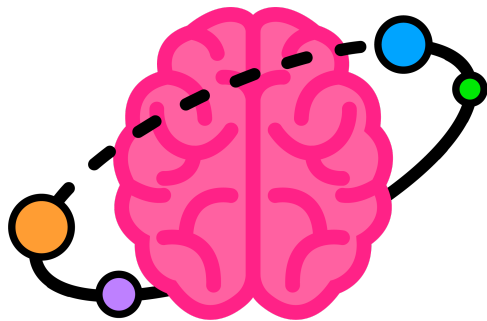


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# Cortical Visual Impairment iOS App: User Experience Research



App Team Carolina, Fall 2021

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# Project Introduction

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## The Client

**Anitha Muthukumaran** teaches students with visual impairment at Douglas Country Schools in Colorado and is currently getting her PhD in special education at the University of Northern Colorado.

Her area of research is to explore how technology plays a role in inclusive classrooms for students with visual impairments. She is looking to provide a link between companies that develop mainstream technologies and teachers who use them in classrooms.

Together with Anitha, we will be building an app for students with Cortical Visual Impairment.

## Introduction

Cortical Visual Impairment (CVI) is the most common visual impairment diagnosis in the USA, and there is no close second place. Still, most people have never heard of it. It's most common in babies and young children, but can continue into adulthood.

A child with CVI has vision problems that are caused by their brain that can't be explained by a problem with their eyes. The disorder is caused by damage to the parts of the brain that process vision, which disrupts the brain's communication with the eyes.

Normally, the eyes send electrical signals to the brain, and the brain turns those signals into images. With CVI, your brain has trouble processing and understanding these signals.

*Cortical visual impairment is often referred to by other terms including: cerebral visual impairment, neurological visual impairment, and brain damage related visual impairment.*

*All of these terms refer to visual dysfunction resulting from injury to the brain.*

When looking for Waldo, children can see the whole picture but are unable to determine where to focus. →



## A Spark of Hope

The wonderful reality of CVI is that it can get better with appropriate intervention. Although there's no direct cure, vision rehabilitation can help people with CVI make the most of their vision.

Babies and kids with CVI need early intervention and therapy, educational support, and other special services to help them develop and learn.

There are not many apps available for Android or iOS that cater to students with CVI. Due to their unique visual needs and often young age, most students with CVI cannot access the abundant online literacy resources that are available to their sighted peers.

**And this is where we come in!**

## Purpose

We will be developing an interactive gaming app that allows younger students with CVI to playfully improve their condition and gradually improve their vision.

Children with CVI need to be taught to understand what they are seeing by highlighting the shapes and salient features of the words.

An example game would be dragging and dropping words into their bubbled shapes. The bubble-word strategy was developed by [Dr. Christine Roman-Lantzy](#).

## Example

If a child with CVI needs to learn to visually discriminate the word “Go”, he or she needs to understand the whole word “Go” and how it is shaped. The bubbled word for Go that is highlighted in red is below:



The idea of this game would be for students to learn to recognize sight words by dragging and dropping the sight words into their bubbled shapes or vice versa.

## More Specifications

### 3 Progressive levels

**Level 1:** Kindergarten sight words - Drag and drop bubbled words with sight words.

Sight Words - Kindergarten			
Quarter 1	Quarter 2	Quarter 3	Quarter 4
I	you	for	help
can	do	have	too
the	my	they	has
we	are	of	play
see	with	said	where
a	he	want	look
like	is	here	good
to	little	me	who
and	she	this	come
go	was	what	does

**Level 2:** CVC words match with bubbled words and high-contrast pictures

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**CVC**  
Read the words. Color the pictures and write the words.

tap		<div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div>
fox		<div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div>
bag		<div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div>
box		<div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div>
mug		<div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div>
kit		<div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div>

www.cleverteacher.com

**Level 3:** Choosing the missing letter, and the students watching the word being bubbled.

**CVC Word Write the Room**  
Find each picture in the classroom. Write missing letter.

Name: \_\_\_\_\_

 b _ _ d	 j _ _ g
 n _ _ t	 r _ _ b
 c _ _ n	 p _ _ t
 s _ _ n	 p _ _ g
 d _ _ g	 h _ _ t

For all activities: Drag and drop the answers. When answers are correct, reward in terms of music (popular songs)! It would be great if teachers have the ability to add or remove words and customize the list of activities and words for their students.

The entire app should be high contrast with bright colors with the least visual clutter. As students with CVI can easily be distracted with auditory distractions especially when they are focusing to see and complete an activity, “read aloud” options should be avoided and the only sound they should hear are “click” sounds and “music” at the end of a successful move.

# Competitive Audit

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For the competitive audit, we observed five apps that already exist on the App Store for Cortical Visual Impairment. Below are our notes on those apps:

App Name	Observations
Tap-N-See Now Lite	<ul style="list-style-type: none"><li>- Red and yellow are the dominant colors</li><li>- Game consists of touching a moving red bear on a black background</li><li>- User must pay to use settings</li><li>- There are no instructions for how to play</li><li>- App includes an about section that explains how certain children react to certain colors better, but the user has to pay for the full version to change colors</li><li>- No end in sight to the game and no change in difficulty - same objective over and over and over</li><li>- Positive and negative feedback sounds</li></ul>
EDA PLAY Series	<ul style="list-style-type: none"><li>- Comes in multiple different versions that appear very similar in style</li><li>- I will be observing EDA PLAY TOM because it is the top result</li><li>- Super cute animation appears when you open the app</li><li>- Settings suggestion pops up immediately asking the user to edit gestures in settings</li><li>- Another prompt asks the user if they would like to record the child's playing</li><li>- App Menu section must be held down for two seconds to open (parental security), same for task overview section</li><li>- No instructions for how to play the game</li><li>- Red and yellow are dominant colors</li><li>- Not clear how the game works, there appears to be a delay</li><li>- It looks like there is an animal on the screen, and you need to tap an item for the animal to use, like a grooming brush for a horse</li><li>- More or less just tapping on the screen to trigger an</li></ul>

	<p>animation</p> <ul style="list-style-type: none"> <li>- Animal bounces if you don't touch the screen for a while</li> </ul>
Big Bang Bundle	<ul style="list-style-type: none"> <li>- Costs \$34.99 on the App Store for a bundle of two apps, and each app costs \$24.99 individually</li> <li>- Cannot afford to buy these apps solely to observe - price is a huge barrier to me and certainly a barrier to users with CVI</li> </ul>
CVI Training (Recognition)	<ul style="list-style-type: none"> <li>- No instructions for how to play</li> <li>- Game consists of touching a random animal - if you touch correctly, it makes that animal's noise</li> <li>- Positive feedback sounds (animal sounds)</li> <li>- There are settings, but you have to fiddle with them to figure out what exactly they do - not appropriately labeled</li> <li>- No text on screen unless settings is opened</li> <li>- No initial home screen - the game starts immediately upon opening the app</li> <li>- Settings offer customization - can change the color and set of animals</li> </ul>
Drag n Drop - BrightLittleEyes	<ul style="list-style-type: none"> <li>- Very cute launch screen animation</li> <li>- User must hold down info and settings buttons to open them (parental security feature)</li> <li>- App provides onboarding information when first opened</li> <li>- Settings allow the user to change the background from black to white (and vice versa) and to choose the color of the game image</li> <li>- Dominant colors on home screen are red, blue, and yellow on a black background</li> <li>- No instructions for how to play the game</li> <li>- Objective is to drag a coin in a random spot on the screen into a piggy bank/jar</li> <li>- Game shows fireworks and cute monkey when the user is correct</li> </ul>



# User Persona

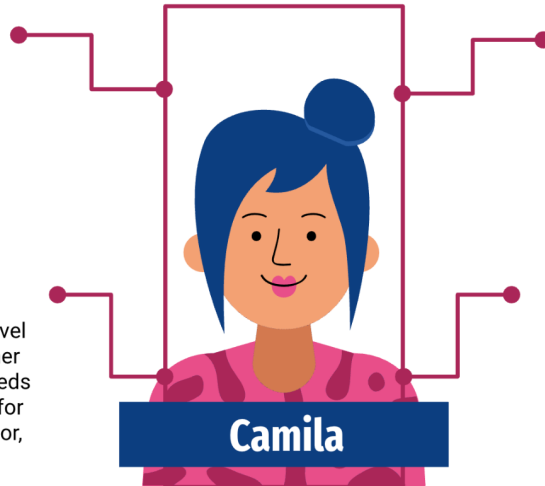
*"I want a way to improve my condition that takes my accessibility needs into account"*

## Profile

**Age:** 15  
**Level of CVI:** Level 1  
**Guardian:** Teachers  
**Where will they use this app?:** Home and school

## Bio

Camila is a 15 year old with level 1 CVI. She wants to improve her condition with a game, but needs the features to be accessible for her level of CVI. Too much color, motion, or sound can be very distracting rather than helpful,



## Goals

- ★ Identify letters and words from bubbles
- ★ Improve their condition
- ★ Constructive feedback messages
- ★ Sound that is descriptive

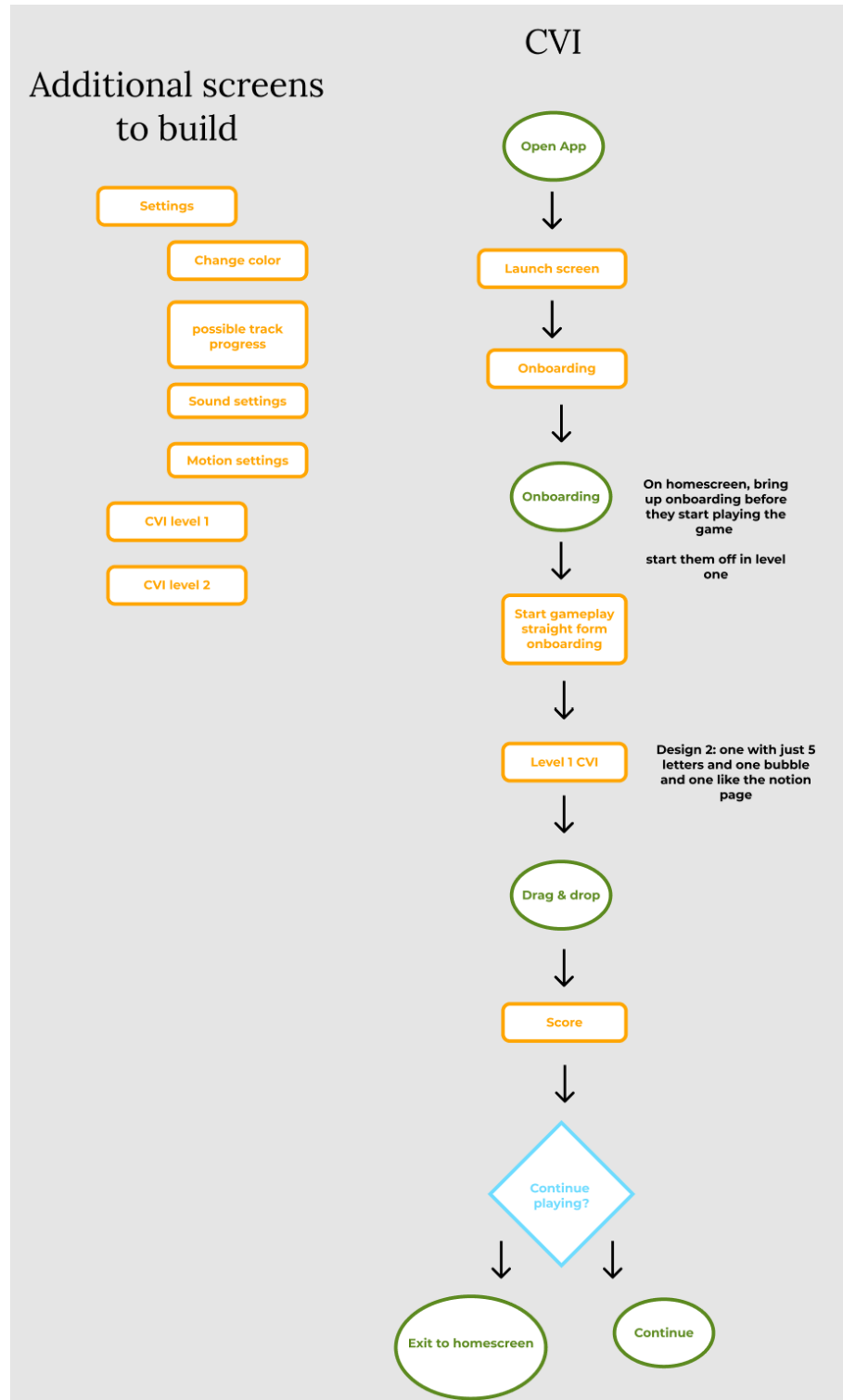
## Frustrations

- Distracting motion
- Too many colors
- Illustrations versus real pictures
- Not being able to determine what letter the bubble wants
- Overwhelming onboarding tutorial
- Too much sound
- Not being able to drag the letter to the bubble

# User Journey

Action	Download App	Open App (First-time User)	Open App (Returning User)	Play the Game	See Score/ Feedback
<b>Task List</b>	1. Guardian downloads app	1. Onboarding (designed for both kids and parents)	1. Resume button 2. Select game and level	1. Drag and drop	1. Progress bar/stars showing how many they got right/wrong
<b>Feeling Adjective</b>	Happy that there is a free app for reading specifically	Have an understanding of what the app is going to be like. Happy for different levels + improvement	Happy to resume back where they were	Word wouldn't place / couldn't get ahold of it, so they're frustrated  Confident and happy when correct	Glad that words were read out loud to them so that it wasn't confusing
<b>Improvement Opportunities</b>	Make sure app focuses on letters and words and is named appropriately	Make sure guardians know how to use the guided access feature	Make resume button very obvious on page	Spacing around bubble that recognizes the drag  Happy sound + have a voice that reads letter (option to turn off)	Have feature to read out loud

# User Flow



# Live Progress

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As of October 14, 2021, App Team Carolina's design team has completed two rounds of wireframes and received both developer and client feedback. We are presently working on building a full, interactive prototype of the app. On Monday, October 11, 2021, we received feedback from the clients on the progress of our prototype, and we are currently working on implementing said feedback.

**View our live Figma file as it is updated in real-time [here](#)!**