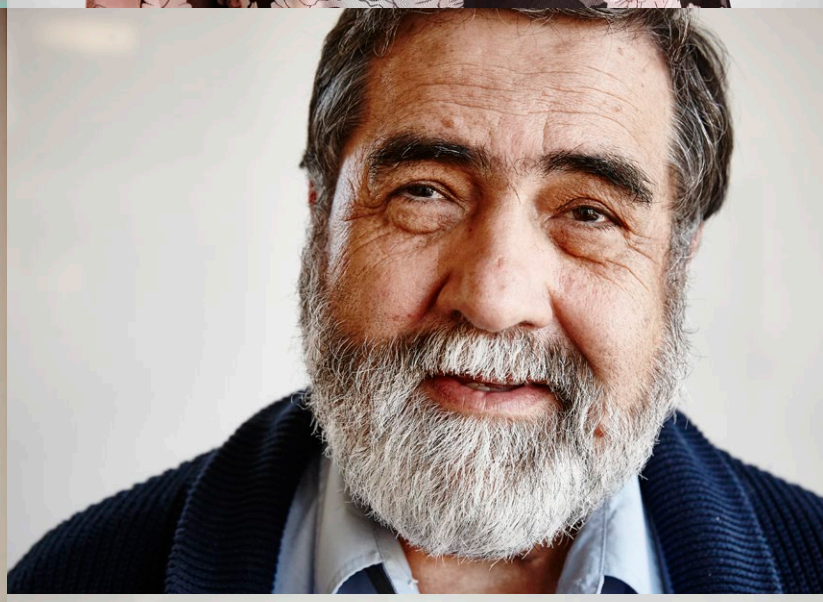
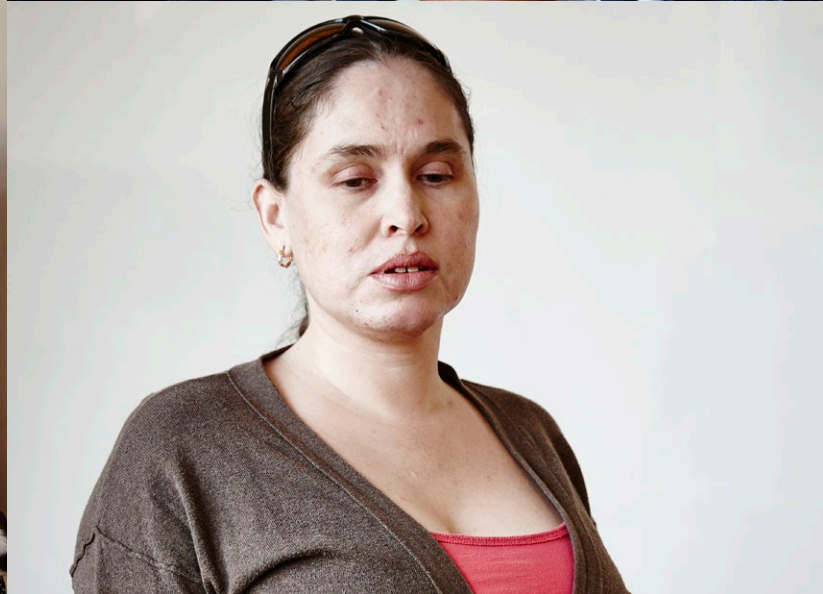
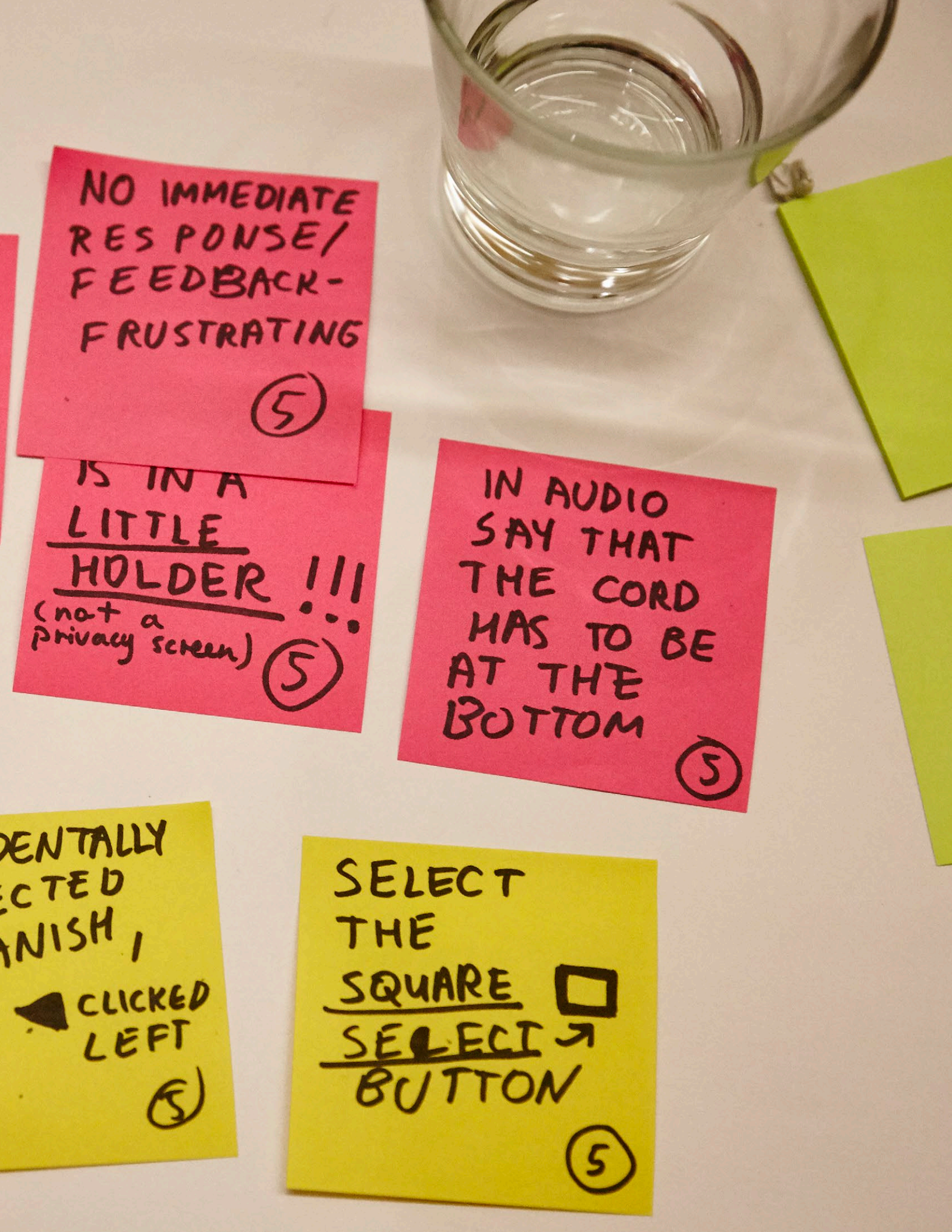
VOX Research Report

AUDIO EXPERIENCE
APRIL 2015






SHOULD GIVE
AN OVERVIEW
WHAT DO
DO WITH
? HOW DO
GET STARTED?
5
SAY "SELECT"
IN BRAILLE
5
SELECT


NO IMMEDIATE RESPONSE/ FEEDBACK- FRUSTRATING
5
IS IN A LITTLE HOLDER !!!
(not a privacy screen)
5
IN AUDIO SAY THAT THE CORD HAS TO BE AT THE BOTTOM
5
DENTALLY
ECTED
ANISH
CLICKED LEFT
5
SELECT THE SQUARE SELECT BUTTON
5

VOX RESEARCH REPORT

INSPIRATION RESEARCH . MARCH 26, 2015
THE AUDIO VOTING EXPERIENCE

Summary

This inspiration research session focused on the audio voting experience, providing the IDEO team with qualitative data to inform our iterative design process. There are few best practices or ideal models for the audio experience. TAC advisors recommended that we prototype a user-driven experience, with tactile keypad input and adjustable audio output. To assess how well this approach might be received by people with visual impairments, we recruited 5 participants with varying experiences of vision loss and varying levels of proficiency with new technology. Participants joined us as co-designers, engaging in the process of voting with an early prototype of the audio user interface, several sample keypads, and a live voiceover actor. Live voiceover allowed our team to redesign immediately, with suggestions from voters and our observations of its usability. With this live and participatory experience, we were able to test and improve the audio voting system during each user session and throughout the day of user sessions.

Qualitative data analysis led to the following insights:

- Voters with visual impairments use many senses to orient themselves to this new device and experience, especially using touch and sound to form their first impressions.
- Discoverability was the convergence of redundant information received through several senses at once, especially the audio voiceover, sound cues, textures, bevels or embossing, indents and protrusions, and haptics.
- Voters with visual impairments had a two predominant learning styles as they adapted to this new voting experience. Like voters who participated in past studies, some were learn-to-do and others were do-to-learn. These styles varied in terms of when and how to provide instructive information.
- Voters with visual impairments appreciate the ability to control their interaction, driving the system and its pace as oppose to having the system drive them.
- Voters with visual impairments preferred the simplest keypad, a cursor cross with center select.

Participants

A total of 5 people participated. Participants were recruited purposefully, meaning that the IDEO team selected participants according to traits that might most inspire audio system design decisions. For this study, participant recruitment was limited to people with severe visual impairments. Within this recruitment category, we selected for diverse participants within the following characteristics: 1. Diverse experiences with vision loss and 2. Varying levels of proficiency with new technology.


YES
NO

Methods

This study assessed the accessibility and usability of the audio voting prototype. Findings from this study provide further inspiration and evidence for the design of the audio voting system. Participants were recruited purposefully for diversity within the following categories: degree of blindness (legally blind to completely blind) and experience with technology.

During in-depth user assessments, five participants completed the following tasks:

1. Approaching the booth, discovering, and accessing the BMD, ballot slot, keypad, and headphones.
2. Starting a vote session.
3. Voting on 4 contests with different selection types.
4. Reviewing and changing votes.
5. Verifying ballot.
6. Casting ballot into an integrated ballot box.
7. Comparing alternative prototypes: Engaged users in a discussion about the pros/cons of alternatives, including 2 BMD booth set-up, 4 keypads, and 10 button styles.

During this experience, participants used the talk-aloud method of describing their actions and thoughts. Each session included 2-4 facilitators, who used a semi-structured guide to prompt tasks and ask specific questions. An observation and analysis team of 6-8 people watched and documented user sessions and feedback. Monica Flores and Brenda Duran from RR-CC were also present as observers. After interacting with the prototype, the user session was concluded with in-depth questions about each user's experiences of voting across their lifetime. Each session was 60-75 minutes. Limitations and biases include Hawthorne effect[1], social desirability bias[2], and sampling bias[3]. These biases were mitigated by using neutral or negative probes, for example "How awkward or hard was that?", and our plan to triangulate across future studies with less obtrusive observation methods.

1 People tend to act differently when they know that they are being watched.

2 People tend toward social acceptable behavior and statements in a new social environment, often avoiding giving negative critique.

3 This is not a random or strictly representative sample of individuals, so their experience and feedback might not be representative of others'.

PROTOTYPES

Two hardware prototypes (Version 5.1.3) were fabricated, each running versions of the User Interface prototype (Version 3.1.3).

Participant Breakdown

The study included 5 participants, diverse in terms of race/ethnicity, gender, age, educational attainment, ability, voting experience, technology experience, and financial status.

Race


White


Asian


Latino

Gender


Male


Female

Age


30-40


40-50


60-70

Educational Attainment

High school	2
Some college	1
Bachelors	2

Voting Experience

Vote on only the big elections	3:5
Vote on all elections	2:5
Haven't voted since vision loss	3:5

Financial Situation

Living month-to-month	1
Have enough but no savings	3
Have enough to live comfortably	1

Touch, sound contribute to a sense of being welcomed.

INSIGHTS & FINDINGS

TOPIC: Getting started.
BIG QUESTION: How might voters with visual impairments orient themselves to this new experience and discover how to get started?
WHAT WE'VE LEARNED: Voters with visual impairments use many senses to orient themselves, especially a variety of touches and sound.
DESIGN DECISION: Continue to refine the start-up process, using touch and sound to direct users toward prescribed initiation steps.
PRINCIPLES: Private & Independent. Easy.

Background

Previous Vox studies focused on the visual cues that might encourage voters to feel a sense of welcome, trust, and ease. However, when designing for people with visual impairments, we needed to establish a design language that did not rely on visuals, a new way of communicating these important first impressions. During this study, we observed people with visual impairments as they got started with a voting session, identifying the aspects of the experience that seemed welcoming, encouraging, and trustworthy.

Findings

Users with visual impairments used all their senses to figure out what it was and how to interact with this new technology. Often starting from right and moving left, they felt along the BMD, quickly identifying the screen, and then along the ballot slot. As they searched for headphones or some other audio device, they felt behind the touchscreen, encountering parts of the voting booth that sighted people rarely investigated. Once they found the headphones, the audio narration began and they were introduced to the system by a male voice. The voiceover performer providing this narration was directed to be encouraging, authoritative, and energetic.

First impressions were built from all the subtle cues such as the smoothness or roughness of textures, the allowances on rounded corners, and the personality conveyed through voiceover narration. Although this simple prototype lacked some aspects of refinement, users commented positively about these design features. They appreciated the tactile friendliness of the prototype, seemed unintimidated by its form, and felt immediately welcomed by the voiceover narration. Voters seemed delighted when the audio narration immediately acknowledged them, after they put on their headphones, and the system provided some feedback that it was powered on and ready to begin an audio voting session. Many described their past experiences with new technology, explaining that half the challenge was figuring out "if the thing was even on." One voter explained that her polling place frequently did not have the audio ballot turned on when she arrived, so she typically had to wait 8-10 minutes in silence to find out if the system was set up correctly and working as it slowly loaded its files.

Recommendations

Recommendation 1A: Design a tactually safe and comforting form, with corners and edges that are rounded enough to be gentle without giving the impression of being belittling like a children's toy.

Recommendation 1B: Voiceover narration, whether human-recorded or artificially synthesized, should be warm and authoritative. In this case, a middle-aged male voice worked well.

Recommendation 1C: Use headphone audio and other non-visual cues to immediately acknowledge the presence of a new voter and let them know that the system is ready to begin.

Discoverability for the sighted is about visuals. Discoverability for people with visual impairments is about everything.

INSIGHTS & FINDINGS

TOPIC: Discoverability
BIG QUESTION: How might we design for easy discovery of the ballot slot, keypad, and headphones?
WHAT WE'VE LEARNED: Discoverability might be enhanced by clear instructions via audio voiceover, sound cues, stereo audio cues, textures, bevels or embossing, indents and protrusions, and haptics.
DESIGN DECISION: Continue to enhance the discoverability of ballot slot, keypad, and headphones through a more nuanced and redundant set of audio and physical cues.
PRINCIPLES: Private & Independent. Easy.

Background

Previous Vox studies focused on text instructions, graphics, and other visual cues that might help voters to find the ballot slot. However, when designing for people with visual impairments, we needed to understand how to use other senses to promote discoverability and understand how these senses work in concert. During this study, we observed as people with visual impairments used non-visual cues to find the headphones, keypad, and ballot slot.

Findings

Whether it was finding the ballot slot, orienting the keypad, or navigating from contest to contest, people with visual impairments used all of their senses to find their way. Features to enhance discoverability included: audio instructions, material textures, bevels or embossing, and indents and protrusions. As people with visual impairments are orienting themselves, they may accidentally interact with the touchscreen and press buttons on the keypad. So, there needs to be tolerance for interactions that are not meant to start a voting session. And then, when they are ready to start the voting session, there must be a simple procedures for getting started. Although this research session did not reveal one perfect procedure, we found two that might be acceptable and usable ways to initiate: pressing a particular button on the keypad or inserting the audio jack.

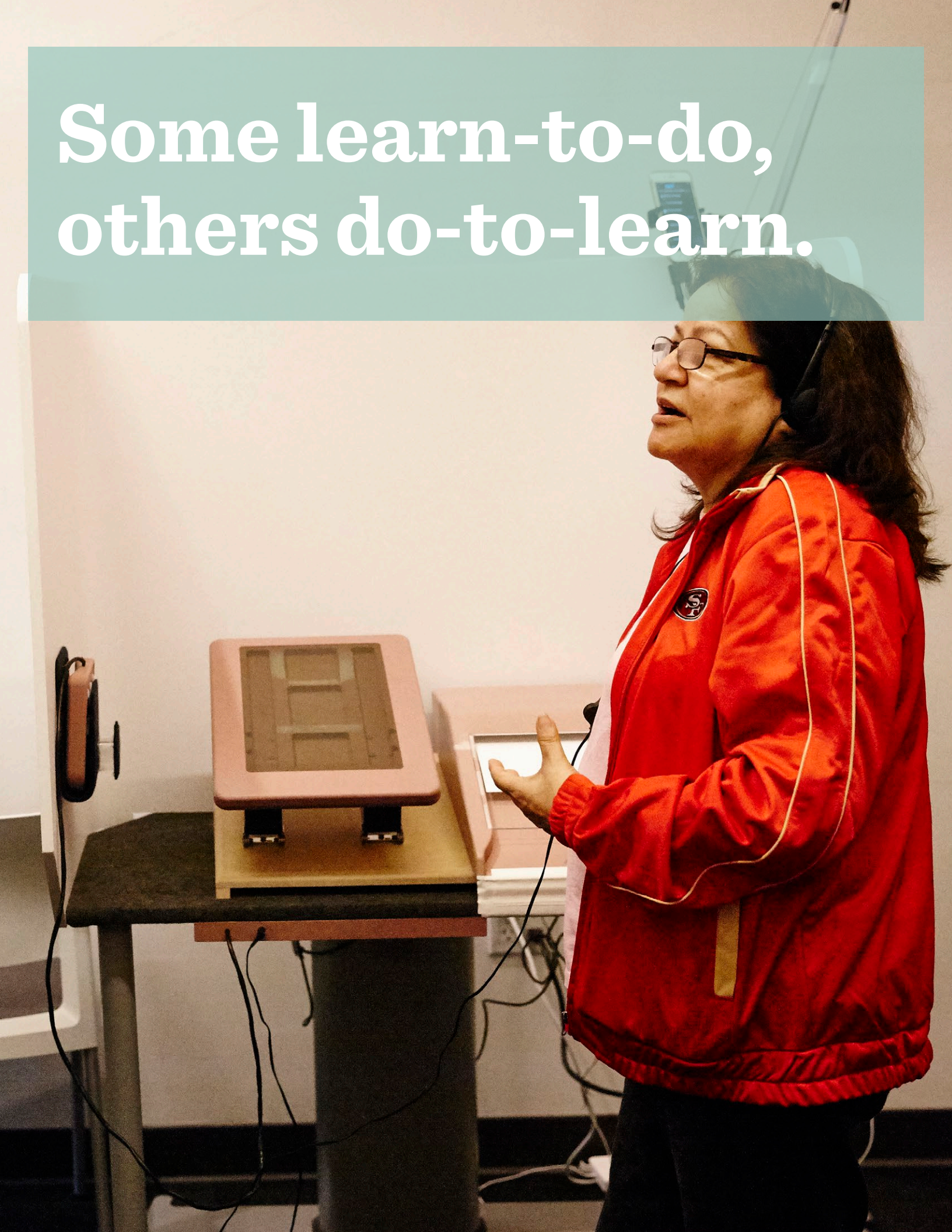
Recommendations

Recommendation 2A: Provide a range of tactile, audio, and other sensorial clues to help people with visual impairments to discover the headphones, ballot slot, paper ballot orientation, controller, and controller orientation. Redundancy is helpful, meaning that three or more cues reinforce discoverability. For example, make the newly printed ballot more discoverable through clear audio instructions, allowing a subtle vibration from the printing mechanism, and tactile indents.

Recommendation 2B: Continue to explore other means of orienting, such as haptics, braille, tactile paths, and stereophonic cues.

Recommendation 2C: Identify one or more ways to officially start a voting session and use all discoverability techniques to point users in this preferred direction.

Some learn-to-do, others do-to-learn.



INSIGHTS & FINDINGS

TOPIC: Instructions
BIG QUESTION: How might voters with visual impairments want instructions provided to them?
WHAT WE'VE LEARNED: Voters with visual impairments had a variety of learning styles with different needs as far as up-front instructions.
DESIGN DECISION: Develop an approach to information sharing that accommodates both those who learn-to-do and those who do-to-learn, providing opt-in instructional opportunities and easy skipping to opt-out of instructions.

Background

As a new system of voting, the Vox project has the responsibility of bridging across analog and digital worlds while helping voters to comfortably learn a new way of voting. During the previous study with all sighted voters, about a quarter (24%) described themselves as people who like to get a lot of information about new technology first and then try using it and three-quarters (76%) said that they preferred to learn by trial and error while using the technology. Most (63%) preferred to get help from other people, although many (37%) preferred to learn it by themselves. Most (67%) preferred to look for tips or tutorials online, while others (23%) preferred to do a live workshop or class. Users were split fairly evenly between those who preferred written instructions (51%) versus how-to videos (49%). We wanted to know how learning styles differed for people with visual impairments and what aspects of the experience might enhance the usability and enjoyability of the new audio voting system.

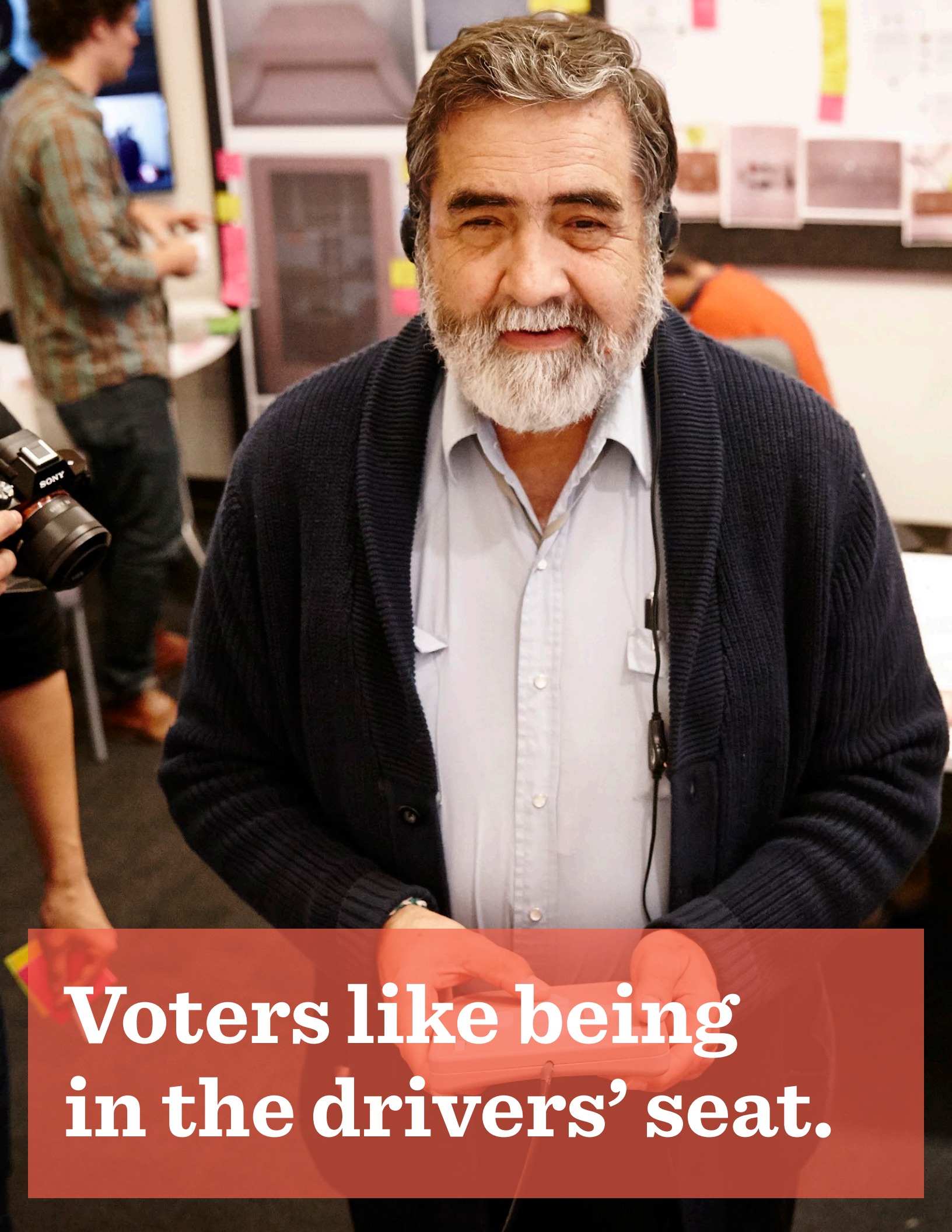
Findings

People with visual impairments had different ways of becoming comfortable with a totally new way of voting. Some had a do-to-learn style, comfortable learning as they went and confident that they would be given the instructions they needed when they needed them. Others had a learn-to-do style, feeling more confident when the whole process and all of its parts were described before starting. Although the sample was not robust enough to make statements that represent the entire community of people with visual impairments, most users who participated in our study preferred to get help from other people (n=4) as opposed to learning by themselves (n=1). Most preferred to go to live workshops or classes (n=4) as oppose to online tutorials (n=1). They were fairly split between those who preferred to learn new technology through trial and error (n=3) and those who preferred to get a lot of information and then trying using a new technology (n=2). Ultimately, we found that this new voting system will need to accommodate the needs of people with a range of learning styles.

Recommendations

Recommendation 3A: Provide early opportunities to opt-in to more instructions and skip to opt-out of instructions, while encouraging voters to trust that the simple process will be described as they go.

Recommendation 3B: Provide accessible community-based classes to give some voters the opportunity to learn and practice before arriving at the polls.



Voters like being in the drivers' seat.

INSIGHTS & FINDINGS

TOPIC: Audio Interaction
BIG QUESTION: How might voters with visual impairments want to interact with the system?
WHAT WE'VE LEARNED: Voters with visual impairments appreciate the ability to control their interaction, driving the system as oppose to having the system drive them.
DESIGN DECISION: Continue to refine simple and predictable ways for voters to interact with the system and adjust the pace of the experience to their needs.
PRINCIPLES: Private & Independent. Easy.

Background

There are two predominant audio interaction styles: computer-driven and user-driven. Computer-driven interactions perform like audio readers, narrating all of the text on a screen from top to bottom automatically. These systems advance automatically, only stopping, pausing, or changing when the voter makes a special selection. A user-driven system, on the other hand, advances one step at a time, only moving forward once the user indicates a direction. This is a more engaged means of interaction and is more rare among the traditional audio access technologies. To design our system, the IDEO team needed to understand which interaction style voters preferred. Specifically, we wanted to understand the degree of control that users wanted over the voting experience. We tested a user-driven system to observe how voters with visual impairments might respond.

Findings

We found that voters with visual impairments liked being in the driver seat, having control of almost all aspects of their interaction, including: advancing, navigating, changing the speed of narration, adjusting the volume, and pausing. Having to drive the system meant that people felt they were managing the pace of this new experience and voting at a speed that felt comfortable for them. A user driven interaction results in more natural pauses in the audio narration, which voters seemed to appreciate. A few participants recommended further enhancing users' ability to control pace by adding buttons for pause and repeat, however all were able to complete a voting session at a pace that felt comfortable.

Recommendations

Recommendation 4A: Use a voter-driven approach to the audio+keypad interaction for users with visual impairments.

Recommendation 4B: Incorporate simple ways for voters to manage the audio speed, audio volume, pausing, repeating, and advancing in the audio interaction.

When the task is complex, the device must be simple.

INSIGHTS & FINDINGS

TOPIC: Keypad
BIG QUESTION: How might we design a simple keypad for people with visual impairments?
WHAT WE'VE LEARNED: Voters with visual impairments preferred the simplest keypad, a cursor cross with center select.
DESIGN RECOMMENDATIONS: Continue to refine simple and predictable ways for voters to interact with the system and adjust the pace of the experience to their needs using the cursor cross with center select keypad.

Background

In designing an audio system, there are several input devices and interaction styles to consider, from numeric phone-like dialing to touchscreen gestures. Through expert advice from advocates in the TAC, we concluded that numeric codes were not adequately simple because they require a voter to memorize numbers as they navigate. In this study, we assessed the preferences of voters with visual impairments around keypads (tactile controllers) and other interaction devices. We tested the simplest keypad, the cursor cross with center select, which had become the most well-recommended configuration among experts in accessible technology. Variations of this style included 1) large-button cursor cross, 2) small-button cursor cross, and 3) four arrows with separate select button. After this research session, the TAC further recommended adapting this style keypad to make it more accessible for people with minimal motor control, like those living with cerebral palsy. This study focused on assessing the accessibility and usability of keypads among people with visual impairments and future studies will examine how to enhance usability even further for other communities.

Findings

We tested numerous interaction devices, with varying numbers of buttons, keypad sizes, keypad dimensions, and button types. The most preferred device was the cursor cross with center select. Voters with visual impairments found this keypad was simple, intuitive, and highly usable during their mock voting session. Although some recommended additional buttons with actions such as repeat or pause, all were able to use this simple keypad to successfully start-up a session, make preferences selections, vote on 4 types of contests, review selections, print ballot, verify ballot, and cast a ballot.

Recommendations

Recommendation 5A: Continue to refine the cursor cross with center select keypad. We might consider adding pause and repeat buttons, although fewer buttons enhance the keypad's usability. We also might consider further testing with the cerebral palsy community to assess accessibility.

Recommendation 5B: Continue to refine the consistency of button-actions, so that the same buttons reliably provoke the same types of actions throughout the experience.

Recommendation 5C: Design and test responsiveness standards, so that voters know within milliseconds that their actions are registered and understood.

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IDEO, 2015

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