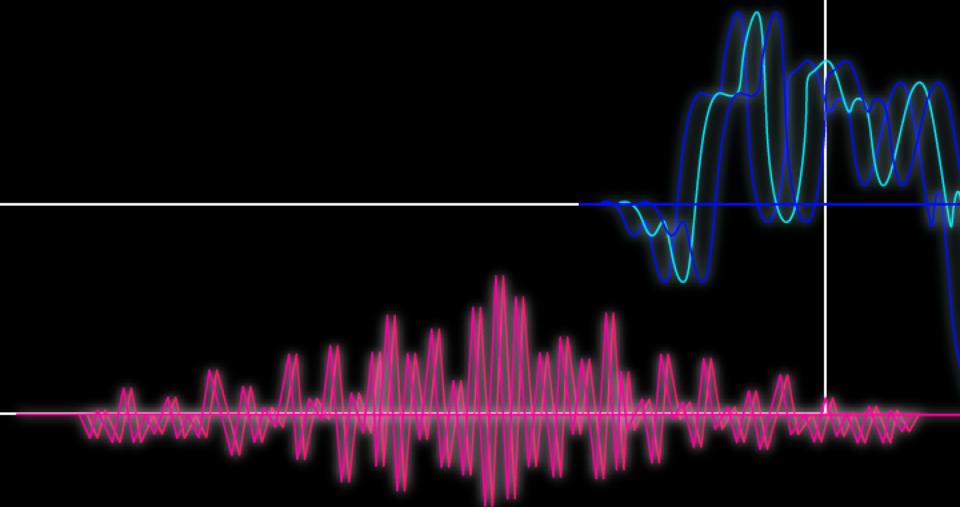


Leveraging Sound to Create a **Positive** User - Interface Experience

Jessica Palmer & Katlin Scott



OUR TEAM



JESSICA PALMER

Senior- Computer Science Major



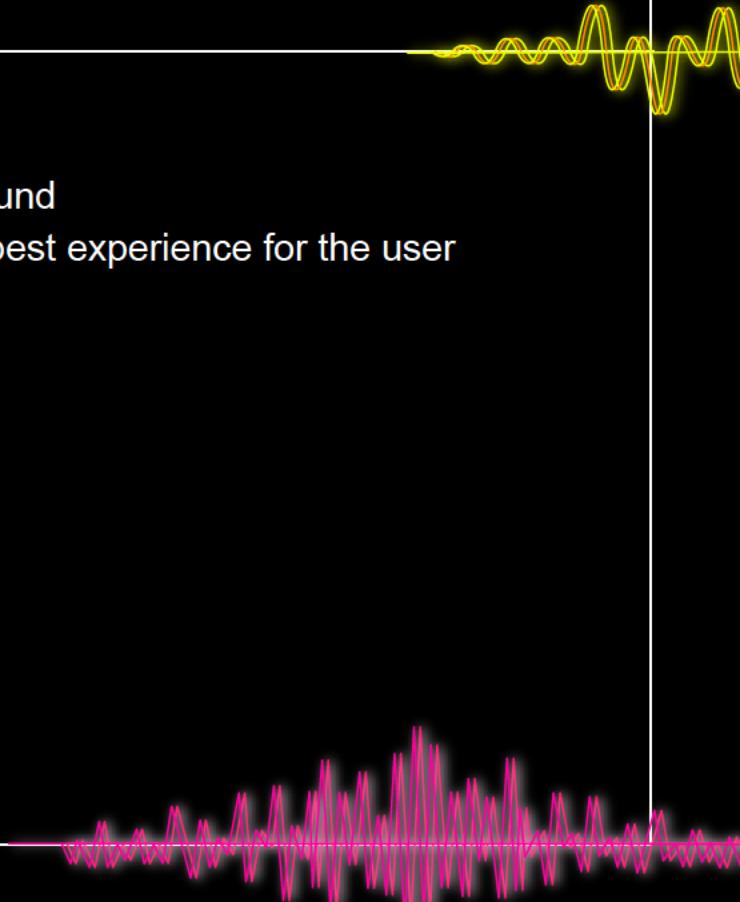
KATLIN SCOTT

Senior- Computer Science Major

Abstract

Objectives

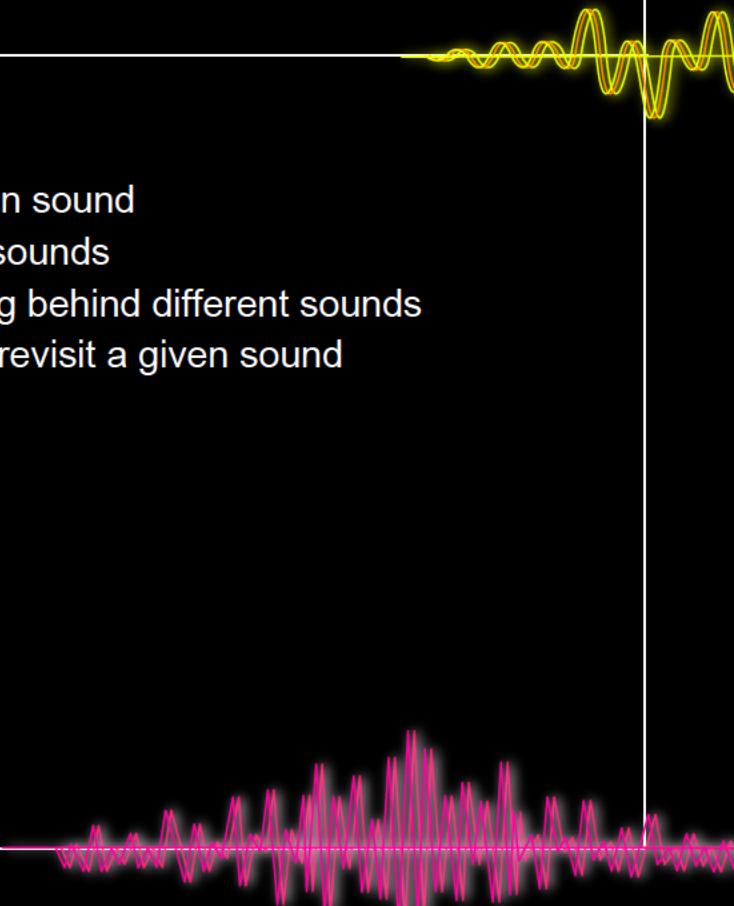
- Connecting the importance of sound in UI design
- Rough idea of how to enhance our experience with sound
- The need to research what kind of sound creates the best experience for the user



Abstract

Methods

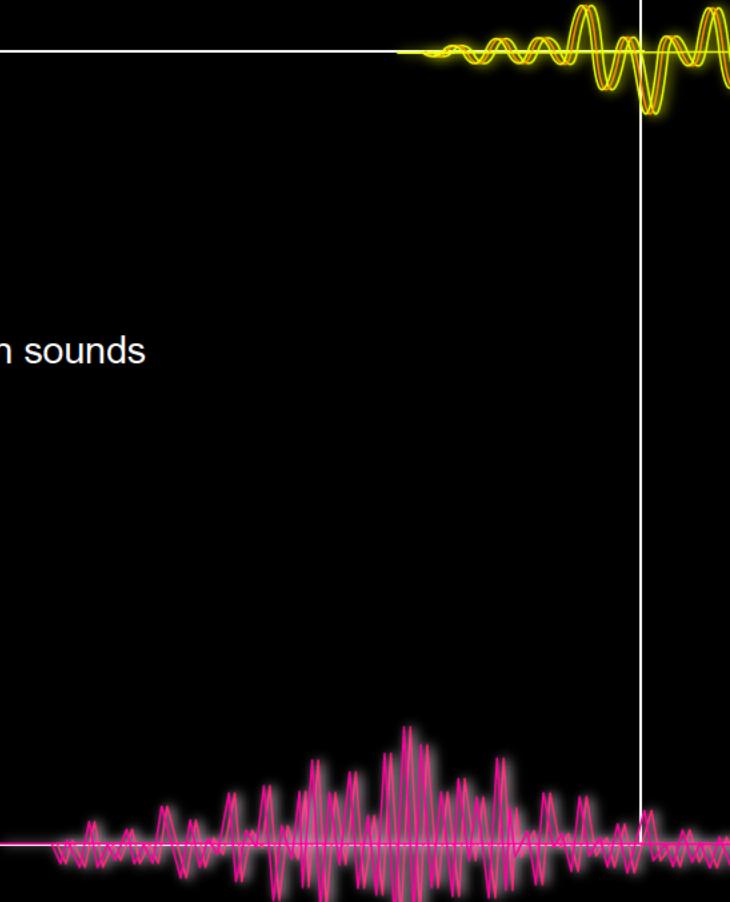
- Research Survey
 - Pre-Survey Questions gauging general feelings on sound
 - Sound Recognition- user identification of certain sounds
 - Sound Reflection- user impression of the meaning behind different sounds
 - Sound Feelings & Preferences user inclination to revisit a given sound
- Used an external website to host the various sounds



Abstract

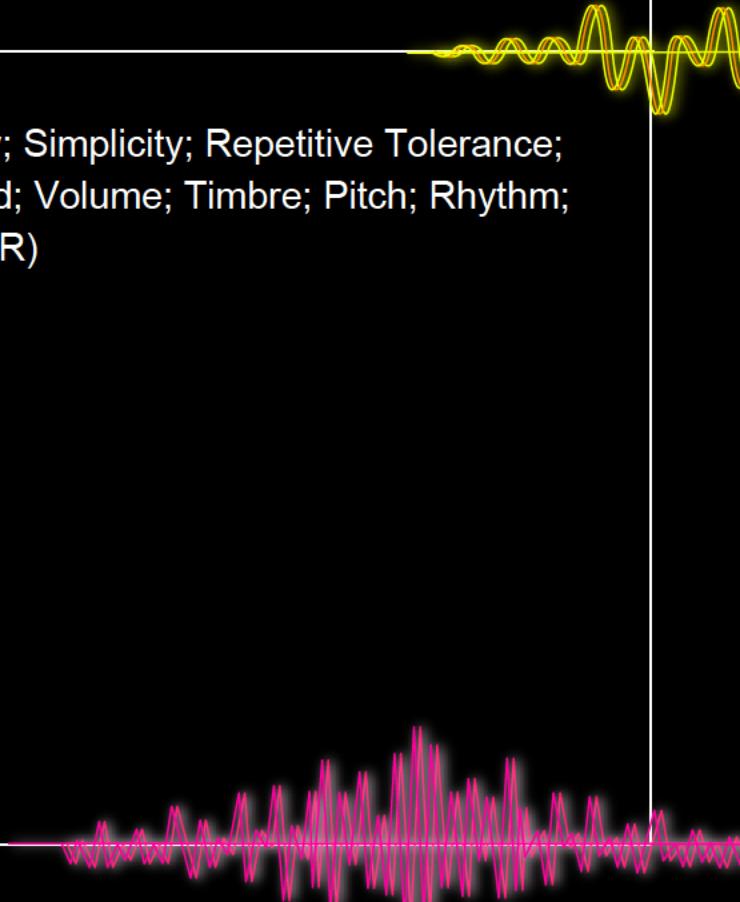
Results

- Users are able to ...
 - Accurately identify certain sounds
 - Accurately associate meaning to sounds
 - Commit certain associations to memory
 - Feel certain intended emotions because of certain sounds



Keywords

User Interface (UI); User Experience (UX); UX Sound; Utility; Simplicity; Repetitive Tolerance; Consumer Electronics (CE); Natural Sound; Synthetic Sound; Volume; Timbre; Pitch; Rhythm; Soundscape; Skin Conductance Level (SCL); Heart Rate (HR)



Introduction



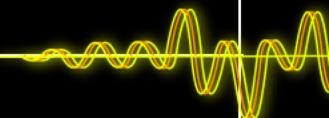
- Advertising jingles
 - Bada ba bap ba jingle
 - Taco Bell sound
- Emotional connections
- Established opinions
- Certain sounds = certain responses
- Important to consider the sounds we use or do not use based on the experience we wish the customer to have

Purpose:

- To make a case for thoughtful sound integration in user interfaces and overall user interactions
- What types of sounds assist in creating a positive experience
- The sounds themselves need to deliver the message they wish to convey or the feedback the user needs to aid in using the interface.
 - Washing machine chime
 - Scanner beep at the grocery store



Background Study/Literature Review



The researchers discovered “an 86 percent correlation between how sound makes people feel ... and the conscious desire to have or avoid that experience in the future [1].” WIRED Magazine

“The fact that the sound and its message are correctly memorized means that the user understands the message correctly when hearing the sound at the real scene [2].” 2016 IEEE 5th Global Conference



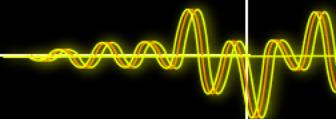
Background Study/Literature Review

According to Leo Foureaux, the primary purpose of sound design of user experience should contribute to “[p]roviding feedback on a user’s action or system status” as well as “[d]rawing attention to important information, such as [a] warning or [an] opportunity,” but first and foremost, it should be used for utility [4].

Dieter Rams has stated, “Good design is as little design as possible” [4].

One article explains repetitive tolerance and why sounds should not be frequently played. If something is even partially frequently played, there should be an option to mute said sound from an application’s interface because generally users don’t like the repetition [5].

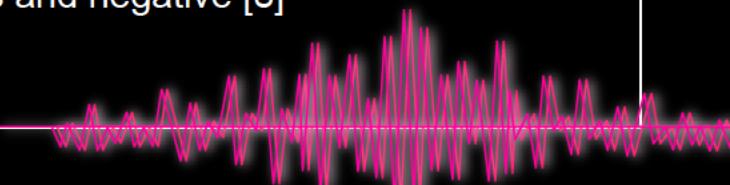
Background Study/Literature Review



- Sounds categorized as annoying were typically found to have higher volume, frequency (sharpness), and/or fluctuations in amplitude (roughness) [6].
- Sounds with low frequency and slow temporal modulations such as ocean waves, thunderstorms, etc. are generally among the most pleasant/relaxing.
- Volume or “sound pressure” was shown to cause a significant increase in avoidance responses and their timing as volume increased [7].

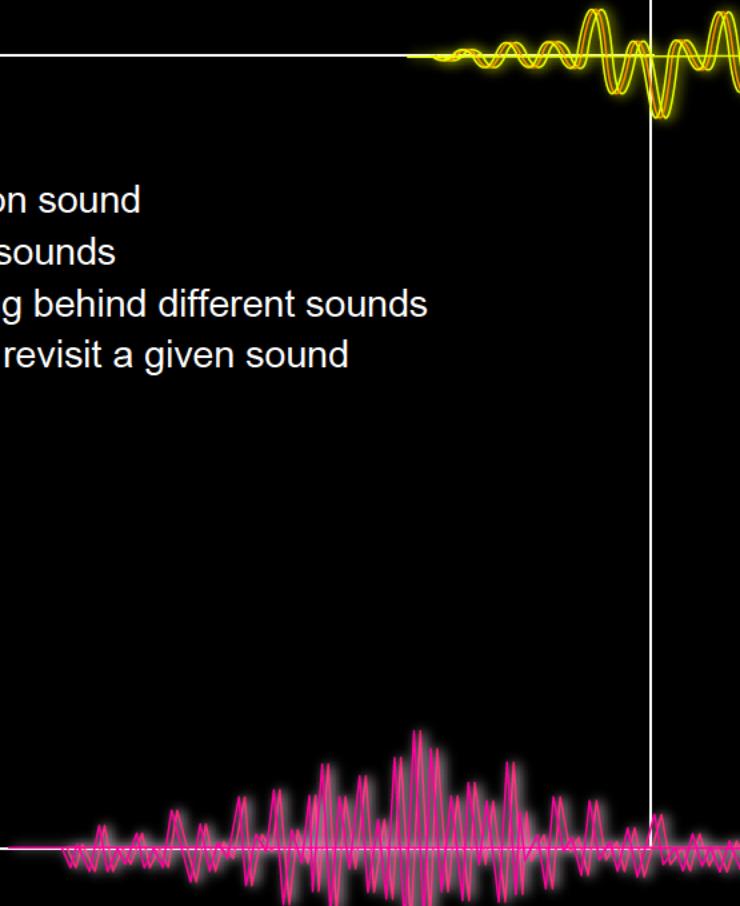
Two variables in soundscapes (valence & activation):

1. Pleasant and eventful were considered vibrant and positive
2. Pleasant and uneventful were considered calming and positive
3. Annoying and eventful were considered chaotic and negative
4. Annoying and uneventful were considered monotonous and negative [8]



Apparatus/Tools/System

- Research Survey
 - Pre-Survey Questions gauging general feelings on sound
 - Sound Recognition- user identification of certain sounds
 - Sound Reflection- user impression of the meaning behind different sounds
 - Sound Feelings & Preferences user inclination to revisit a given sound
- External website to host sounds



Research Survey Section 1



CS 4712: Research for UI and Sound

This form is to gather information about people's feelings on UI and sound. There will be four different pages for the different types of questions you will be asked. The survey should not take long to complete.

Note: The sounds are in the bold, blue hyperlinks. These links will direct you to an external site where we have hosted the sound clips. Please select the corresponding one by number/name.

Disclaimer: You will be asked to listen to sound. It is recommended to use headphones, but it is not required.

[REDACTED] [Switch account](#)

Not shared



* Indicates required question

What is your experience with sound in applications and websites? *

1 2 3 4 5 6 7 8 9 10

Annoying Enjoyable

For your phone notifications, how do you feel about having sound on? *

- Always
- Only for the important stuff
- Never

On a scale of 1 to 10, how important do you think sound is for the user experience? *

1 2 3 4 5 6 7 8 9 10

Not important at all Very important



Research Survey Section 2

Recognition Questions

For the following sounds, please select the object that you believe makes that sound.

Sound 1 *

Choose

Bird

Flowing Water

Car

Dog

Fire Alarm

Choose

Sound 4 *

Choose

Sound 5 *

Choose



Research Survey Section 3

Reflection Questions

For the following sounds, please rate how willing you would be to listen to the sound again and what action this sound means.

On a scale of 1 to 10, how willing would you be to listen to this [Sound 6](#) again? *

1 2 3 4 5 6 7 8 9 10

Not willing at all Very willing

On a scale of 1 to 10, how willing would you be to listen to this [Sound 7](#) again? *

1 2 3 4 5 6 7 8 9 10

Not willing at all Very willing

What kind of action do you think this [Sound 8](#) represents? *

- Select
- Start
- Complete
- Warning

What kind of action do you think this [Sound 9](#) represents? *

- Select
- Start
- Complete
- Warning

What kind of action do you think this [Sound 10](#) represents? *

- Select
- Start
- Complete
- Warning

Research Survey Section 4

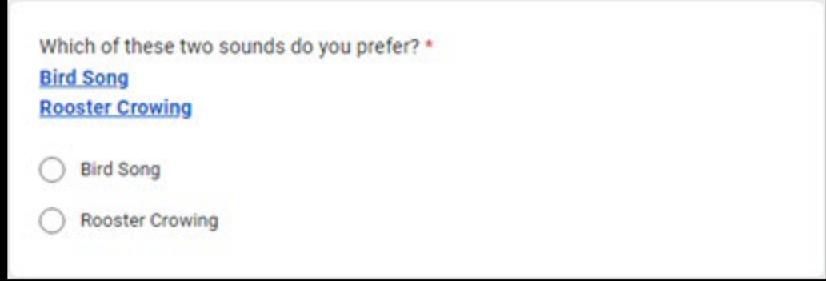
Sound Feelings & Preference

How do you feel listening to this [Sound 11](#)? *

- Happy/Joyous
- Goofy/Funny
- Sad/Depressed
- Anxious/Panicky

How do you feel listening to this [Sound 12](#)? *

- Happy/Joyous
- Goofy/Funny
- Sad/Depressed
- Anxious/Panicky



Which of these two sounds do you prefer? *

[Bird Song](#)
[Rooster Crowing](#)

- Bird Song
- Rooster Crowing



Apparatus/Tools/System

External Website

Sound Files

Sound Recognition

- ▶ Sound_1 00:00 / 00:22
- ▶ Sound_2 00:00 / 00:08
- ▶ Sound_3 00:00 / 00:08
- ▶ Sound_4 00:00 / 00:08
- ▶ Sound_5 00:00 / 00:04

Sound Reflection

- ▶ Sound_6 00:00 / 00:08
- ▶ Sound_7 00:00 / 00:04
- ▶ Sound_8 00:00 / 00:02
- ▶ Sound_9 00:00 / 00:03
- ▶ Sound_10 00:00 / 00:00

Sound Feelings & Preferences

- ▶ Sound_11 00:00 / 00:08
- ▶ Sound_12 00:00 / 00:08
- ▶ Bird_Bong 00:00 / 01:31
- ▶ Rooster_Crowing 00:00 / 00:08

Website



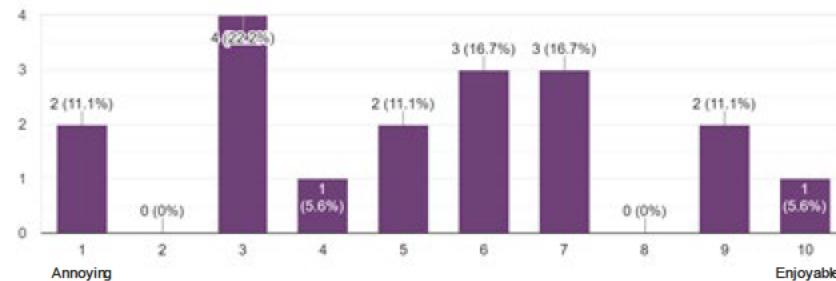
General Sound Questions

RESULTS & ANALYSIS



What is your experience with sound in applications and websites?

18 responses



On a scale of 1 to 10, how important do you think sound is for the user experience?

18 responses

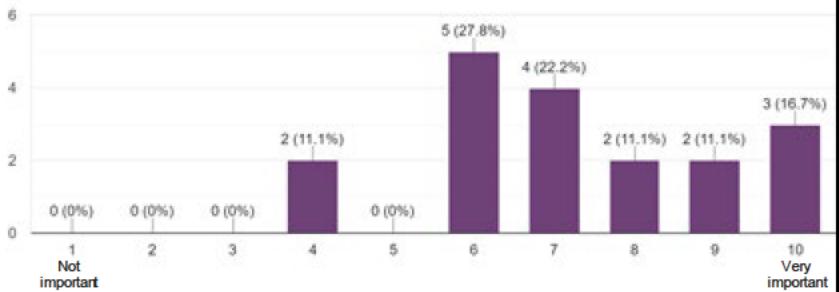
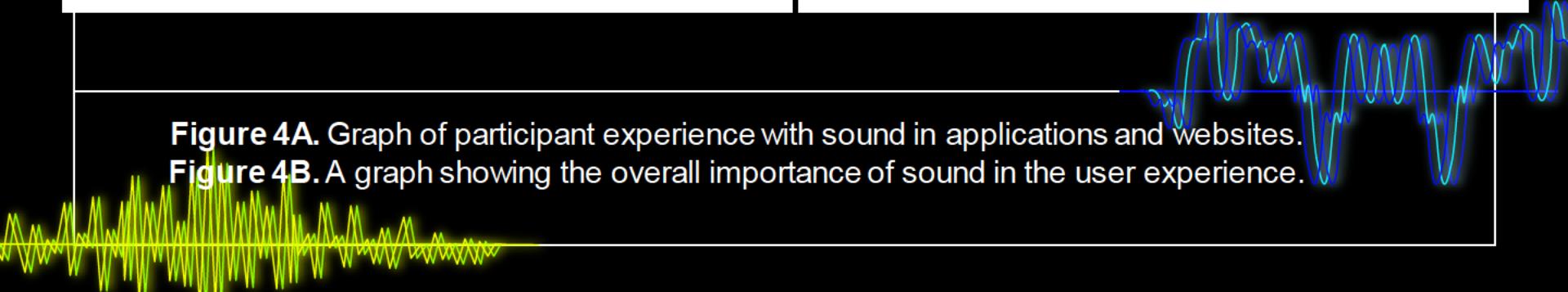


Figure 4A. Graph of participant experience with sound in applications and websites.

Figure 4B. A graph showing the overall importance of sound in the user experience.



General Sound Questions

RESULTS & ANALYSIS

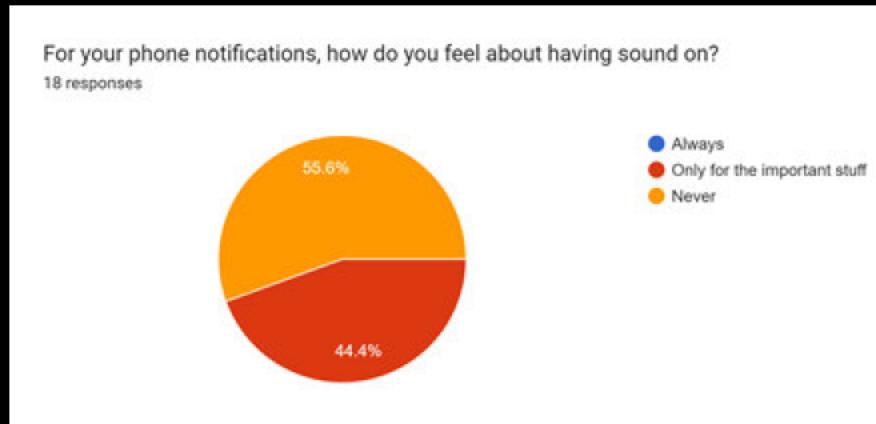


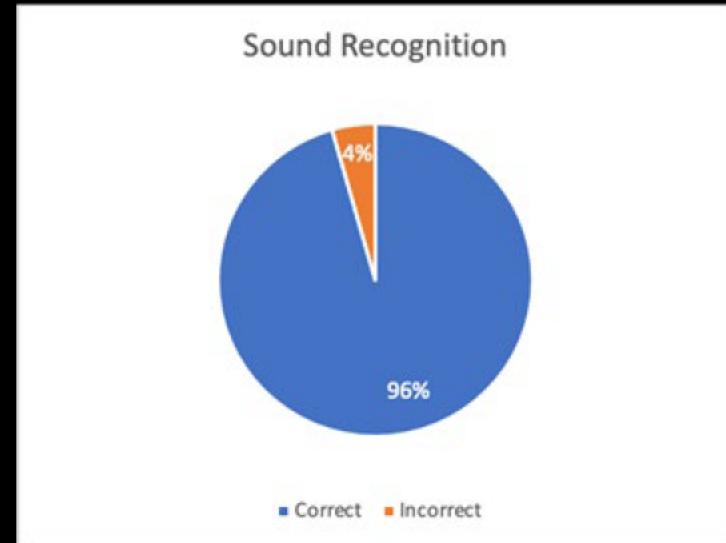
Figure 5. A graph of participant phone notification preferences.

Sound Recognition



RESULTS & ANALYSIS

Figure 6. A graph of the overall accuracy of participants recognizing sound.



Sound Reflection RESULTS & ANALYSIS



On a scale of 1 to 10, how willing would you be to listen to this Sound 6 again?

18 responses

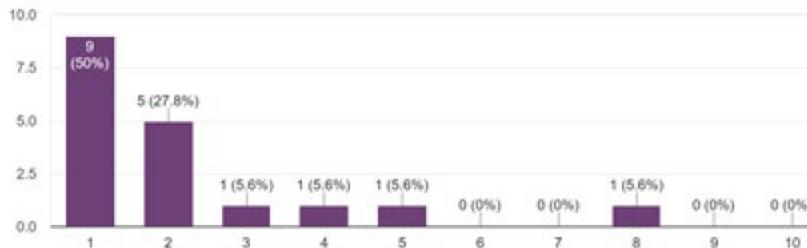


Figure 7B. Positive Response Trend for Flowing Water Sound

On a scale of 1 to 10, how willing would you be to listen to this Sound 7 again?

18 responses

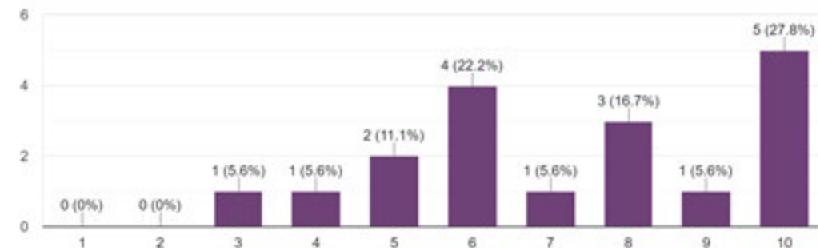
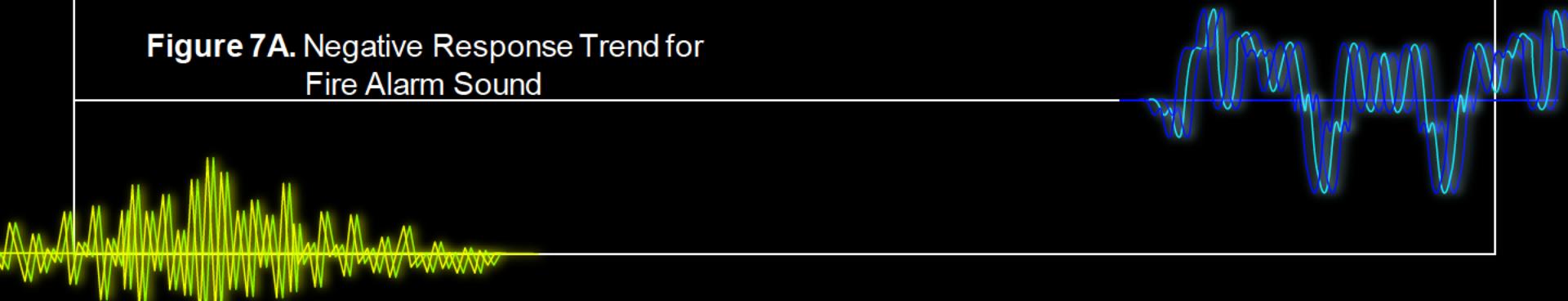


Figure 7A. Negative Response Trend for Fire Alarm Sound



Sound Reflection

RESULTS & ANALYSIS

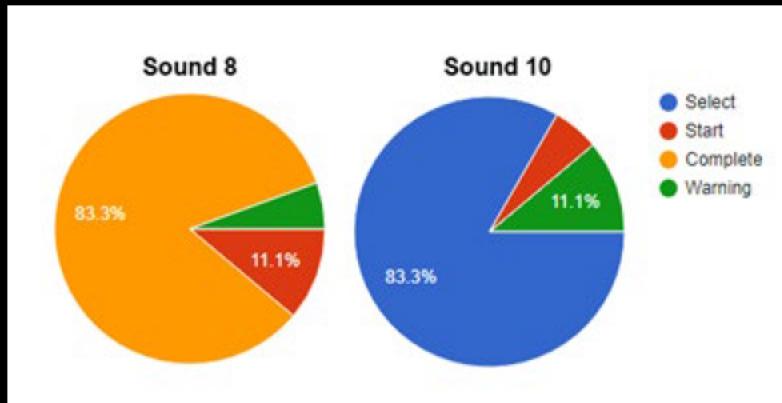
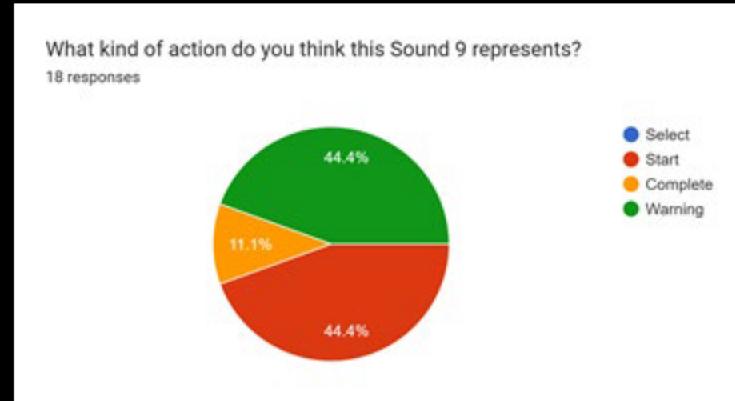


Figure 8A. Two graphs where sound meaning was more distinct.

Figure 8B. A graph of a particular question gauging participant understanding of specific sound meanings.



Sound Reflection

RESULTS & ANALYSIS



Which of these two sounds do you prefer? Bird Song Rooster Crowing
18 responses

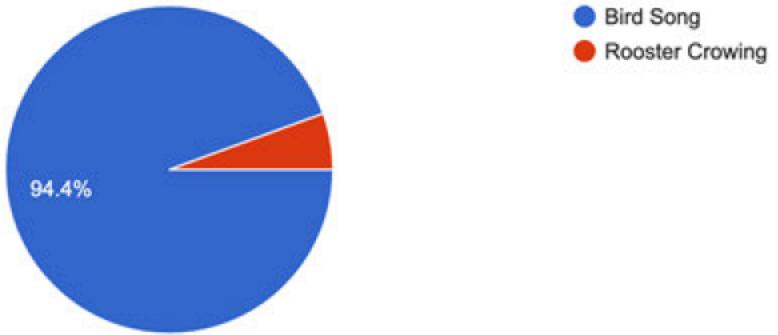
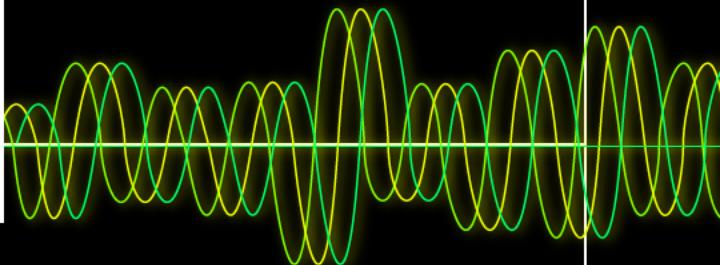


Figure 9. Participant preference between different bird sounds.



CONCLUSION



Participants are able to...

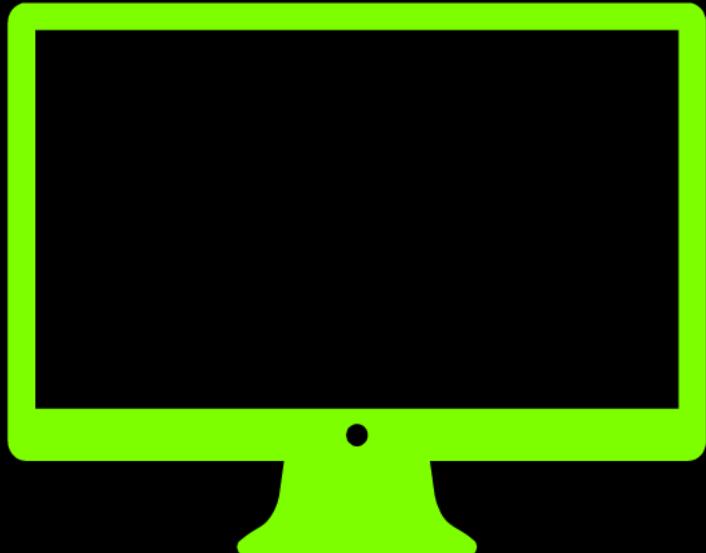
- Accurately identify certain sounds
- Accurately associate meaning to sounds
- Commit certain associations to memory
- Feel distinct emotions because of certain sounds



FURTHER RESEARCH

Some things that can be done to further knowledge about sounds in UI:

- Create a couple of simple websites
- Utilize the metrics available for web designers to see how users respond
- Have a feedback survey available for users.
- Make use of more sounds and offer the ability to muted/ disabled.
- Are there specific sounds that are confusing to users or cause an adverse reaction?
- Fine-tune our conclusion to specific volume levels and keys/ tones.



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Thank you to our participants

Questions ?

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