Exploring Conversational Interfaces as Sites for Collaborative Sensemaking around Data

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ABSTRACT

Conversational and voice user interfaces present new opportunities for people to collaboratively and interactively engage with audio content and develop analytic listening skills. Yet content delivered via voice often fails to make use of the technology's unique affordances, including interpersonal interaction and the blending of speech and non-speech sounds. My work explores how voice interaction, sonification, and narrative can support people as they learn to listen to data. Participating in the CUI@CSCW workshop will help me deepen the themes of collaboration and collective sensemaking in my research on conversational sonification.

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KEYWORDS

Voice user interfaces; data sonification; personal informatics; collaborative sensemaking; vocal sketching

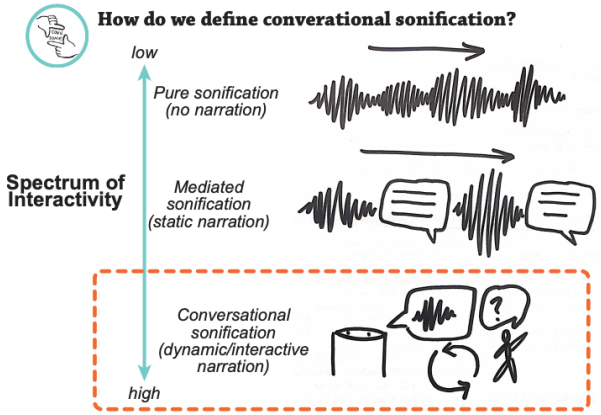

Figure 1: Sonification practitioners typically present sonifications as stand-alone artifacts, often without any narrative. Using traditional audio media, such as radio, I have created sonifications that are mediated by narratives. Conversational interfaces present opportunities for fully interactive sonification, where users could ask questions, provide feedback, and engage with other users around sonification.

INTRODUCTION

Voice and conversational interfaces present new contexts for people to interact with audio—untethered from their screens, immersed in their environments, and operating in a conversational mindset. Working at the intersection of voice interfaces and sonification, my research explores how these two underutilized, yet promising, technologies can help people develop the skills they need to learn to listen to data through conversational sonification [Figure 1]. Moving forward, I hope to explore how voice user interfaces might facilitate acts of collaborative making and sensemaking with personal data by supporting new ways of listening and using our voices.

PREVIOUS WORK

My past projects have explored data sonification—the practice of using non-speech sounds to convey data [7]—and how acts of making, often with sound as a material, and interpersonal exchange can lead to deeper engagement with data. These have surfaced new ways that conversational and voice user interfaces might encourage novel and collaborative interactions with information and data.

Collaborative making with data and sound

In "Recipes for Breaking Data Free," [11] I created audio compositions based on data from a wrist-based activity tracker, representing my heartrate with my voice and my step-count with stacks of coins. Drawing inspiration from the Fluxus movement, which has inspired recent critical design work in HCI [4], I presented these audio compositions as recipes to encourage others to attempt similar acts of exploration through making. I also exchanged audio compositions with another person to create a data duet, prompting the provocation: *"How can co-experiencing personal data through collaborative performance illuminate the nuances of our individuality?"* [11, p. 4]

Expanding this theme, in "Entangling the Roles of Maker and Interpreter in Interpersonal Data Narratives: Explorations in Yarn and Sound" [6] my co-author and I collected data about ourselves, created physical and sonic artifacts representing that data, and then exchanged them without any guidelines as to how to interpret them. This act—a radical departure from my previous commitment to making data representations understandable and approachable as a data journalist—exposed the interplay between creation and interpretation. Our project suggested how bespoke data representations, through a medium such as sound, can simultaneously provide avenues to protect data and to share it. If only one person understands the mappings between sounds and data, sensitive data can be kept secret even if it is broadcast in group settings. On the other hand,

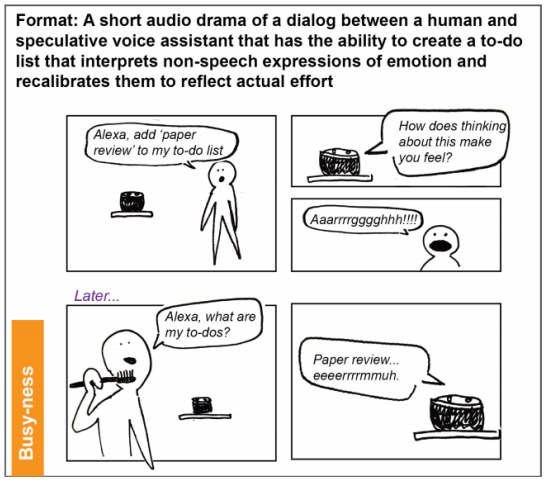

Figure 2: One of the sonic data artifacts I created in [6] considered how someone might use non-speech sounds to communicate with a voice assistant (listen at: https://soundcloud.com/j_wirfs-brock/a-conversation-with-alexa-about-busy-ness).

Conversational interfaces—and in particular voice-based interfaces—present new ways for people to interact with sounds. Currently, non-speech sounds are used exclusively outputs. But why can't they also be inputs?

inviting others to join in the puzzle of perceiving sonic data artifacts may surface new and unexpected insights.

My work has also explored how we might use logged personal data to imagine new interactions with voice interfaces, building off of calls for the HCI community to use metadata as a resource for design [3]. In "Giving Voice to Silent Data: Designing with Personal Music Listening History" [12], we led design activities where participants, in pairs, used personalized data profiles about their Spotify listening history to design interactions with a near-future voice assistant. These design activities surfaced the social components of interacting with voice assistants around music, such as the live co-creation of playlists, as well as how users desire voice assistants to function as personalized music coaches rather than voice-activated remote controls. A key finding was how logged personal data can serve as a trigger for voice interactions, helping users discover new ways to explore a voice assistant's capabilities.

Combining narrative, sonification, and conversational interactivity

I have created several audio pieces that combine narration with sonification to support listeners as they learn to interpret data [13, 14]. Two of these pieces, for the nationally syndicated business show Marketplace [8, 9], aired as an interview format, opening up possibilities for how conversation can scaffold the process of developing the analytic listening skills people need in order to interpret sonifications. In my current work, I am exploring how we might re-think these types of radio sonification narratives for interactive voice and conversational interfaces.

AREAS OF FUTURE EXPLORATION: COLLABORATION THROUGH VOICE AND CONVERSATIONAL USER INTERFACES

My previous work opens up several new directions for exploring voice and conversational user interfaces as sites for collaborative sensemaking that I am eager to discuss in the CUI@CSCW workshop.

Encouraging new ways of listening and creating

During the Covid-19 pandemic, a friend (and sound designer) and I began recording mundane, daily sounds and sharing them with each other as a way to manage and reflect on our shifting relationships with time. First, we recorded sounds we found interesting. Then, to remove the element of intention, we recorded sounds at randomly selected moments. Now, we are creating and sharing sounds to form a sonic "exquisite corpse." This type of project is helping up foster—through recording and interpersonal exchange—new ways of listening and of relating to sound. As we have been using our mobile phones to record and exchange sounds, I have been reflecting on how voice and conversational interfaces might support new dimensions to this project. Conversations with a voice assistant could time-shift and facilitate our asynchronous interactions.

These interfaces could also be sites for us to record, manipulate, and share sounds. The prevalence of visual sound editing technology has changed the way sound designers relate to sounds and practice acts of listening [1]. So how might considering voice interfaces as platforms for creating and editing non-speech sounds [Figure 2], rather than just a tool for content consumption, introduce new ways of relating to sound?

Exploring voice platforms for testing and scaling audio designs

How can the existing large-scale adoption of voice platforms be leveraged for new types of prototyping and evaluation that brings end-users into the design process? I am curious to explore how we might develop methods to not only conduct tests on the effectiveness of voice and conversational applications, but for testing *through* and *with* these technologies. Consider an interactive voice application that presents a data sonification—perhaps of public health data such as local Covid-19 cases—and then asks comprehension questions ("Is the number of cases increasing, decreasing, or staying the same?"). This type of interaction, in addition to supporting active learning for the listener, could provide designers with valuable information about what types of interaction sonifications are most effective.

Voice and conversational interfaces as sites for collaborative sense-making around data

What new collaborations between humans and computer agents might be possible if we extend interactions to include activities such as vocal sketching [5] or data karaoke [10]? Data visualization literacy principles note that creating and interpreting visualizations are complementary skills that are best learned in conjunction with each other [2]. Voice and conversational interfaces could be promising platforms for exploring whether the same holds true for sonification literacy. Perhaps the interactive sonification, described above, might also present data and then ask users what they think a sonification of it might sound like before playing it for them. Listeners could hear the sonifications that other people contributed, developing a collective understanding of how a community's impressions match the data being collected. These types of interactions could also be useful for exploring and understanding personal health data.

CONCLUSION

Voice and conversational user interfaces present new opportunities for people to interact with content and with each other. I am interested in exploring how they can be sites for people to collaboratively explore new ways of listening to speech and non-speech sounds for engaging experiences with data. I hope to explore these ideas at the CUI@CSCW workshop.

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