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Research to Understand and Inform the Impacts of Ambient and Designed Sound on Informal STEM Learning, or *Sound Travels*, is supported by the National Science Foundation (#2215101).

Sound Travels: visitor research update

The *Sound Travels* project brings together informal STEM learning (ISL) researchers, designers, and educators to 1) broaden the research foundation for sound design in ISL experiences, and 2) develop design recommendations for informal learning institutions. This brief summarizes key ideas from our visitor-focused data collection in project Year 2.



About the research

Our research seeks to learn 1) how soundscapes are used by ISL practitioners, 2) the qualities of soundscapes at different ISL sites, 3) how informal learners at ISL sites experience sound, and 4) how qualities of the soundscape correlate with indicators of learning.

Data collection

The three sites where we collected data in Year 2 of the project are all located in Columbus, Ohio and represent different ISL experiences. At each site, we collected data in two “zones” – one indoors and one outdoors.

Franklin Park
Conservatory



Columbus Zoo
and Aquarium



Metro Parks –
Blacklick Woods



Methods

At all three sites, we used three data collection methods for this research.

We used **AudioMoth loggers** to record ambient sounds. Two to four audio moths in each zone recorded constantly during data collection hours.



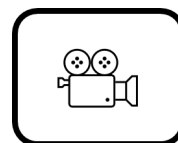
~120 hours
of audio

We recruited **visitors** as they **exited** a zone to complete a five-minute **questionnaire** about their experiences with sound.



961 completed
questionnaires

We recruited **visitors** as they **entered** a zone to participate in a **Sound Search** by using a tablet to record sounds as they explore the zone. After recording their videos, visitors participated in a brief **interview** and completed the **questionnaire**.



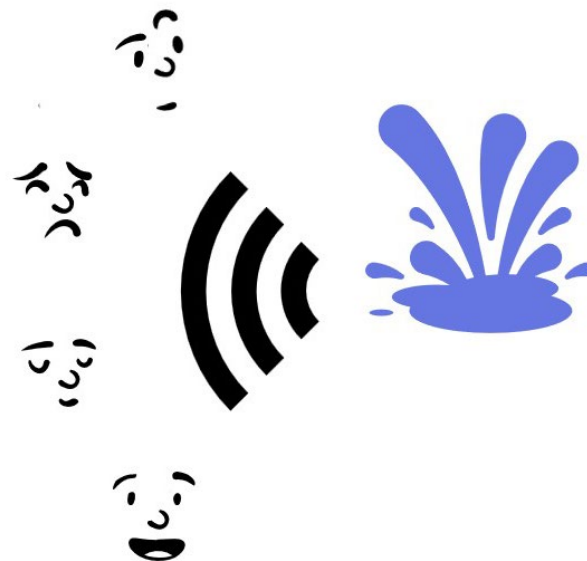
148 individuals
557 videos

Promising findings from Year 2 data collection

Finding 1

We observed an association between having a strong opinion of the soundscape during their visit and people's reported learning engagement outcomes.

Data from our questionnaire suggests that, regardless of other factors, visitors' reported experiences with sound within an ISL experience seem to have an important role in what they take away. Our next phase of research will explore potential relationships between these perceptions and indicators of learning (e.g., attention).



Finding 2

In their Sound Search videos, visitors used many of the same sounds to represent different emotional states, affirming that individual sounds hold a range of meanings to people.

Sound Search participants recorded sounds that made them feel curious, uneasy, peaceful, or energized, but they expressed variation in what they associated with these categories. For example, moving water was a common sound source in participants' videos, but it was used to exemplify all four states.

Finding 3

Certain emotional associations were less frequently named for specific sources of sound.

When we applied content tags (i.e., categories of sound sources) to the Sound Search data, we found that some sound sources were present across adjectives but were a lot less common for specific feelings. For example, human sounds (i.e., those produced by human bodies and voices) were proportionally much rarer in association with feeling peaceful, and other biogenic sounds like birdsong (i.e., sounds produced by non-human organisms) were proportionally rare in association with feeling uneasy.

Finding 4

In their Sound Search interviews, visitors talked about sound in ways that were similar to ISL practitioners' descriptions of sound in the same settings.

Visitors tended to speak in terms of sound sources, and especially human ones. They also described sounds using aesthetic (e.g., "pretty") and emotional (e.g., "happy") descriptors and frequently selected sounds that were intentionally included in the learning environment. These patterns aligned with Year 1 data from ISL practitioners.

What's next?

We are now exploring visitor data and ambient recordings (in combination) for patterns. We are also comparing individuals' Sound Search and questionnaire data to explore what we can learn about cultural associations and personal preferences. Meanwhile, our teammates are helping identify applications to programming and environmental design for ISL.

For more updates, check out our website: www.terc.edu/soundtravels