A Story of Space and Sound - Affordance of Sound in Cartographic Storytelling

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Abstract:

Sound is everywhere. Just like space, sound can give us context to where we are in relation to the environment and each other. It encapsulates meanings and can help us picture the nature and dynamics of our surroundings. As an elementary component of human senses and our daily life, we rely on sound to perceive and interpret the world. In the context of Cartography, there has been emerging interest and exploration in the intersection between sound and maps - henceforth referred to as Sound Cartography.

This abstract presents an on-going project that aims to assess and advance Sound Cartography, through (1) establishing a fundamental frame of reference, and (2) demonstrating the importance and opportunities that Sound offers by evaluating the *affordance of sound in map use. A prototype is being developed to test, in particular, the affordance of Sound in one specific application.

| *affordance is hereby defined as the capabilities and potential uses that an entity or a process can offer.

Firstly, built upon existing taxonomy, the author proposed a framework to guide the discussion of two overarching domains in Sound Cartography: (i) Sonification of Space and (ii) Spatialization of Sound - and the space in between. Given the framework, this research then provides context and dives deep into a sub-domain of interest - *Map with Sound*. Specifically, *Map with Sound* will be applied and validated through the lens of map affordance for the purpose of cartographic storytelling.

SOUND CARTOGRAPHY				
Domain	**Subdomain**	**Referenced**	**Information Communicated (WHAT)**	**Primary Medium (HOW)**
Sonification of Space	**Map *In* Sound**	Thulin: Sound As Map	Space	Sound (ambience)
		McMurray: Mapping In Sound		Sound (human)
	Map *With* Sound	Thulin: Map Into Sound		Map
Spatialization of Sound	**Map *About* Sound**	Thulin: Map Of Sound	Sound	Map
		McMurray: Mapping About Sound		
	Map *Of* Sound	McMurray: Mapping Of Sound (/as Interface)		Map (with sound recordings)
In Between	**Map *By* Sound**	Thulin: Sound Into Map; McMurray: Mapping By Sound	Space	Map ⇔ Sound

Figure 1. Proposed framework of Sound Cartography, built upon two concept models from Thulin (2018) and McMurray (2018).

Every map is a story. Every map has a narrative to be told, a message to be shared with the audience. Spatial stories connect individuals with our surroundings and with each other. This essence of map is captured and represented by Cartographic Storytelling, which encompasses any expression or mode of embedding and sharing stories through maps. With the democratization of web cartographic tools, 'story(-telling) maps' have garnered more attention in recent years (Caquard, 2013; Roth, 2021); there has been a surge in applications that explore and demonstrate the power of maps in shaping and sharing meaningful narratives, and vice versa.

However, Cartographic Storytelling - and Cartography in general - remains predominantly a visual-based discipline. The presentation and comprehension of maps have historically been relying on human vision heavily (Brauen, 2012; Brittell, 2018). Sound, as important it is as a way through which humans understand and connect with the world, has been notably under-utilized in maps (Bearman, 2013). While maps, especially maps as stories, are made to correspond with and support relation building in human's perception and conception of the world (Fairbairn et al., 2021), there is a resounding silence in maps - an absence of the auditory sense. In the context of Cartography, the application and the affordance of Sound is largely unexplored, with even fewer attempts from the perspective of storytelling.

The overarching objective of the project is to evaluate the potential and effectiveness of Sound in supporting the function and experience of cartographic stories. Through an empirical testing of a prototype, this work will shed light on whether sound as a medium is useful and helpful - and to what degree - for telling stories in relation to space, which then serves to validate the role and functions of Sound in map use. The study will be conducted as a randomized controlled experiment, with Sound as the independent variable. Study results will then be compared and validated against the hypothesis.

This research will be one of the first of its kinds to evaluate the affordance of Sound in Cartography, and especially in the context of Storytelling. There has been very limited literature and research on how Sound can be utilized in maps, and even fewer on how it can be incorporated to support not only comprehension of information, but also emotional engagement with our audiences. As well, existing research on maps with sound focus often on experimenting with human voices for the purpose of navigation (e.g. in location-based services), and mostly as an alternative approach to support users with visual impairment. This work serves to deconstruct the current limited soundscape in cartography, and to shed light on how music and sound effects specifically can contribute to storytelling and building emotional connection with our audiences. Most importantly, this project seeks to challenge the existing norm of considering Sound as the lesser, diminutive alternative in the cartographic experience, and pushes the frontier on establishing the gravity of the integration of visual and audio experiences - weaving space and sound together as a vital instrument to elevate cartography, and the stories we share.

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