Sound as a means to enhance visitors' engagement in museums

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Museum practices, Visitors' engagement, Sound classification, AI-based sound.

ABSTRACT:

This paper investigates the extent to which sound, in all its facets (thereby including also music and voice), is used in museums as a means to enhance the visitor experience and to facilitate visitors' engagement with the exhibition. This is done by creating a taxonomy of its most common uses and analysing them in the light of a theory of soundscape.

Questo articolo analizza in che misura il suono, in tutte le sue sfaccettature (inclusi quindi anche musica e voce), venga utilizzato nei musei come strumento di progettazione per migliorare l'esperienza del visitatore e facilitarne il coinvolgimento con l'esposizione museale. A tal fine, viene creata una tassonomia dei suoi usi più comuni e li si analizza alla luce di una teoria del paesaggio sonoro.

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Introduction

In a recent podcast on *Sounds of heritage*,[1] John Beauchamp and Katarzyna Jagodzińska talk about sound as a form of heritage that is often overlooked in heritage discourse and introduce their initiative of a register of heritage sound as a testimony of the value of sound as such a heritage form.

While this demonstrates the attention that scholarship is devoting to sound research (as this special issue also testifies), in this article, I do not intend to walk that road, and discuss sound as heritage form worth analysing further. Rather, I intend to investigate how sound is becoming part of museums' curatorial practices and an element in the design of exhibitions, as a tool to support the narrative and enrich the visitor experience and help create new meanings. This approach is very much in line with the current focus on *experiences* in museums[2] and in particular on multisensory ones.[3] This article therefore attempts at developing a classification of current curatorial and design practices involving sound. This classification, far from being exhaustive, is rather a mapping of recurrent uses of sound to enhance the experience of museum-goers. It is meant as a tool to support designers in their design choices when designing museum experiences, so that they can choose what proper form of sound to use depending on what they intend to design. But it can also be a starting point for future research on how sound might be deployed in museums.

In an attempt at developing this taxonomy, my approach to sound goes beyond its commonsense definition of both natural and man-made sound, like that of machineries, and involves any kind of auditory, or sound signal,[4] as foreground sounds that demand attention, thereby including also music and voice, but not noise, nor the keynote sounds in Schafer's soundscape definition,[5] that is the environmental place-based background sounds. Silence, to be understood not as the absence of sound but as an acoustic, and therefore narrative, element as Schafer already posited in his seminal work,[6] is also not included in this overview of museums' curatorial practices and exhibit design using sound.

Literature review

The attention to sound as one of the defining elements of an environment and as an important one to understand an environment *narratively* originates from Schafer's seminal work on the concept of *soundscape*[7]. In this work, Schafer analyses and distinguishes among different types of sound (from keynote sounds to signals and soundmarks) and explains their narrative power in helping understand the environment they are part of culturally, socially and beyond.

The reference to Schafer's classification has impacted museums in prompting their multisensory turn, away from the centrality of vision typical of Western museology[8] towards an approach to museum exhibition design that also involves other senses, like touch, smell and sound, indeed.

In the literature, different types of sound uses in museums are identified. They include *ambient sound-*

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scapes to create atmospheric environments that transport visitors to different times or places, like in history or natural history museums.[9] *Sound as a form of heritage*,[10] as mentioned at the beginning of this article, whereby sound elements are treated as cultural objects themselves through the use of original recordings in museums thereby safeguarding their authenticity. *Sound as a form of art*, as with music, when this becomes the object of the exhibition.[11] *Interactive sound installations* to foster visitor participation. According to studies by Wakkary and Hatala,[12] such interactive installations increase visitors' engagement time and encourage their exploratory behaviour. Research by Bitgood[13] further demonstrates that exhibitions incorporating soundscapes increase visitor dwell time by 40-60% compared to silent displays. The multisensory stimulation they trigger appears to capture and sustain attention more effectively than visual elements alone. Sound, as a matter of fact, as scholars like Droumeva[14] claim, can convey cultural meanings that visual displays alone cannot capture, as Schafer's discussion of soundscape had already pointed out. Additionally, sound installations generally demonstrate positive effects on the visitor's experience in that they facilitate what Dudley[15] calls 'material consciousness', that is a heightened awareness about exhibition spaces and collection items. This heightened awareness can emerge precisely as the result of engaging multiple senses simultaneously, what makes such encounters embodied. The combination of the embodied character of such encounters and of a multi-sensorial space makes the perception of the museum collection and the resulting museum experience more memorable, and meaning making a whole embodied and immersive experience as well.[16]

Sound installations tout court can make museums more accessible to diverse audiences, like visually impaired visitors, for whom audio descriptions and sonic cues provide essential navigation and interpretive information.[17] For neurodiverse visitors, soundscapes can create more welcoming environments by providing predictable auditory structures or calm zones.[18]

Finally, *sound as narrative*, ranging from audio guides, to oral histories and first-person accounts. These latter ones in particular have proven especially effective for creating empathy and personal connection,[19] while research by Bedford[20] shows that hearing authentic voices and testimonies deepens emotional engagement with difficult histories and marginalised perspectives. Falk and Dierking's contextual model of learning[21] suggests that sound helps visitors construct meaningful personal narratives by triggering memories and emotions.

Curiously, there are other ways of including sound in museums. In the exhibition *A Red that Sings*,[22] at the Royal Museum of Fine Arts in Antwerp (KMSKA), sound is used as a metaphor to describe how colours can be experienced, like "red, which sings".[23] But even in the less lyrical forms described in this section, what emerges from the overview above is that sound use in museums seems to result in an emotionally resonant experience on many levels. Sonic elements, regardless of their nature (among those discussed in

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this article), do as a matter of fact carry meanings, evoke emotions, and support meaning making, as Schafer had already pointed out clearly in his foundational soundscape analysis.[24] Museums that use them therefore create richer, more memorable, and more accessible experiences in that they engage visitors fully, sensorily *and* emotionally.

Sound as a tool to enhance the experience of museum goers

Of the many approaches that can be recognised related to sound use in museums, three seem to be the most common ones that I could identify so far. The taxonomy that results from this analysis (see in Table 1) is therefore based on cases I experienced myself in the mainly Dutch speaking (i.e., Flemish and Dutch) museum landscape. This explains its inevitable incompleteness. It has no ambition to be a benchmark, rather just a starting point to explore sound practices in museums further.

At what can be considered a more basic level in a taxonomy of sound as a design tool to augment the visitor experience, lies the use of sound in mainly scientific museums. These museums are often discovery-driven, their exhibitions are built in a way as to nudge visitors to do, to experiment, to try out. There, therefore, sound is used to accompany many visitors' actions during their discovery journey. Often, sound is part of the device that the visitor is activating and is intended to make this action more vivid, tangible and real. But at times, this matching sound-movement is there just to stress the visitor's action on the device and to make the experience more 'dramatic', in a way.

We can call this use of sound as *sound-as-machinery*. In a way, this is similar to what Schafer calls a keynote sound (see again in Table 1), i.e., the background sounds that define a sonic environment and determine the setting of a sonic narrative, in that they still shape the visitor's emotional and cognitive frame.[25] By their remaining in the background, these (keynote) sounds do not distract visitors from their main activity, but help create that sense of being transported into a different time and place. In a history museum, this type of sounds can correspond to the ticking of a historical clock. In our own design of the *Secret Marquise* exhibition,[26] sound-as-machinery was the crackling of the fireplace in one of the period rooms.

In a science museum, this is the result of acting on a machinery (thereby its name), like turning a crank, or the noise of a spinning wheel and looms in a textile museum or the energy mixer at the NEMO museum in Amsterdam.

A further use of the sound-as-machinery notion is to be seen in the Chocolate Nation in Antwerp. This, as a matter of fact, represents a case of a museum that, while not being a history or science museum but rather an *experience* museum, still uses sound in the manner just described. In this museum, visitors wander in an experiential journey of smells, tastes, and sounds that brings them from the cocoa plantations in Africa to the port of Antwerp. The pinnacle of this journey and the climax of the story that is told in this way is an immense and fantastic machinery which occupies a prominent position, both in the museum

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space and in the story.[27] Here, visitors are emotionally drawn into the production process of cocoa beans while this spectacular machine gets into motion adding lights and projectors to the sounds of its engines moving, thereby making it a truly sensorially immersive experience.[28] This is what makes it an experiential journey: a journey that triggers all senses, not just the eyes, and in which sound, the sound of this imposing machinery, helps cater for this amazing experience.

The example just illustrated can in fact be considered at the crossroads between the sound-as-machinery layer and the next level in our taxonomy of soundscape, that we could call the *sound-as-space* layer.

At this layer, the museum space becomes the storyteller and, in this context, the museum space and the exhibition are the stage on which this story unfolds. Then, sound, often, but not always, as music, can become very relevant to create an (even more) immersive (and dramatic) experience.

Of this type of sound use, the examples abound.

The first ones that comes to mind are the still relatively popular immersive experiences à la teamLab:[29] for them, music (rather than simply sound) is integral to the curatorial practice. While this is effective to augment the experience, and to immerse visitors completely, it is questionable whether this is also effective from a curatorial point of view: sometimes, like with the van Gogh immersive experience that travelled the world a few years back, the choice of the music is not always entirely aligned with the historical framing of the paintings that are being projected but it is definitely instrumental to the creation of an even more amazing 'wow' effect. And also, as an imaginative trigger for and from the paintings: emotional and narrative immersion is then achieved at its fullest.

But next to these cases, there are many more exhibitions where music is an integral part of both the curatorial practice and the exhibition design.

Again, at the Royal Museum of Fine Arts in Antwerp, for example, the just ended exhibition on Eugeen Van Mieghem, a local artist from the start of the 20th century, with paintings portraying the city with her harbour and its inhabitants (migrants, dockworkers and vagabonds), alternates the works grouped by topic (e.g., celebrating carnival or scenes from everyday life in the city) with the sound of the scenes depicted in those works. So, the port-related wall is augmented with the typical noises one can hear at the port: the voices of the dockworkers, the engines of the ships approaching or departing, the cawing of seagulls, the wind. At the corner related to the carnival ball, one can hear toasting glasses, people's laughter and chatter, music. It is not clear whether it is the visitor's movement that activates this sound or whether this is simply pre-programmed and is launched at a regular interval. What is clear however, is that this sound, together with the fact that the exhibition is displaced in one single and not too big room, which is kept relatively dark, with an equally dark floor, helps immerse the visitor in the atmosphere of the city in the early 20th century. Here, sound amplifies what space

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already insinuates.

This sound-as-space resonates with Schafer's signal sound concept[30] in that it is more prominent than the sound-as-machinery discussed before and therefore eligibly becomes part of the visitor experience. Its function is not just to set the tone of the exhibition space, to contribute to its atmosphere by transporting visitors into another (spatial or temporal) dimension, but to explicitly add meaning to it thereby affecting the visitor's meaning making process and ultimate experience.

Somehow similar is Yates and Løvlie's use of the concept of "experience blend"[31] as a design approach for historic house museums, in which sonic elements are integrated smoothly (*blended*) with the physical environment so that they do not overtly compete for visitor attention. Their research explores how carefully designed ambient soundscapes can enhance immersion and authenticity without disrupting the contemplative atmosphere characteristic of historic house museums.[32] It is this *blendedness* that makes the sound used in these historical house museums sound-as-space rather than sound-as-machinery, thereby bringing this practice conceptually closer to the immersive cases mentioned earlier.

A special mention here are virtual exhibitions, in which visitors explore a physical space by means of VR goggles. Also in this case, music, predominantly, is integral to the curatorial design and beneficial to the ultimate visitor experience: just like music in films, it adds a dramatic tint to the events unfolding.

Finally, *sound-as-storyteller*, when sound is used as a tool to support the oral narrative when this is told by a digital storyteller, like an avatar, something that has become possible because more and more museums are deploying installations and experimenting with generative AI.

Contrary to the sound as narrative discussed in the literature overview above, sound-as-storyteller also includes music when this has the same function music has in movies: to give emphasis to the story, to mark certain dramatic moments in the storyline by creating suspense, generating apprehension, instilling fear, or celebrating happy moments. This entails that the exhibition tells a story by means of a character, either fictitious or historical, and this telling is emphasised by background sound (the sound-as-machinery discussed earlier, or the keynote sounds by Schafer). If I think of the exhibitions with a digital human I have experienced myself recently, I cannot find one concrete example of this scenario. The very simple reason for this is that the function of the digital human is to actively engage visitors in a conversation, by answering their questions and sometimes challenging them with critical answers or additional questions.[33] The type of dialogue that is generated in this way depends on the prompts that the visitor inserts, and essentially because this is not a story, there is no function for music as sound-as-storyteller to put emphasis on any of the sentences that the digital human utters, as in any normal conversation would be the case.

Yet, a similar but different case is when the digital human simply tells a story rather than trying to engage visitors in a dialogue, a story that

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foresees a very tiny space for interactivity. Then, these moments might be emphasised through music as sound-as-machinery. The resulting experience feels more like being immersed into a movie with the main character talking to the viewer/visitor and asking them a few questions at critical points in the storyline to enhance that sense that a conversation is taking place, while it is not (the interactivity I was referring to before). This is for example what happens with the exhibition *Encounters in wartime* which was for a short time on display at Hertogenbosch Heritage in Den Bosch.[34] In this context, sound as well as music are used as elements of the story that is unfolding, as an integral and not circumstantial part of it, as in a movie, as it were.

But the most frequent occurrences of sound-as-storyteller remain those in which a story is told. Nowadays, the emerging use of generative AI also in museums has given rise to many digital humans doing so.[35]

A very special case of this is yet another form of AI-generated storytelling: at the same Royal Museum of Fine Arts in Antwerp, AI is used to reproduce Magritte's voice and tell stories that could not be told otherwise.[36]

René Magritte is known for not being a public speaker. There are apparently only three such public lectures he gave, one of which was given at the Antwerp museum in 1938, to explain the meaning of his art. But none of these lectures was recorded back then. So, to celebrate this one lecture, the museum reconstructed Magritte's voice through AI using archival recordings and it is him that the visitors can listen to during this exhibition. What makes this unique is the fact that the story that is told is based on that one particular lecture, which has been reconstructed using the notes taken by one of the curators. These are the only traces that are left of it. And that this story is told in the artist's own, albeit reconstructed, voice. In this sense, this is like listening to the real Magritte himself talking to you. There are several of these 'listening stations' in the exhibition space that give visitors the impression that the artist is explaining his artworks directly to them, adding in this way an element of personalisation to the whole experience. The reproduction is said to be very faithful and respectful of the artist,[37] so, in this way, putting a layer of authenticity to this otherwise non-authentic experience.

Table 1 summarises the taxonomy just discussed and shows how and why the newly proposed terms differ from the original benchmark soundscape developed by Schafer.[38]

The development of Table 1 is not intended as an academic exercise for its own sake but as a way to cater for and recognise recent developments, for example precisely in the use and role that generative AI is taking up in the design of exhibitions and in its function in a possible soundscape of museum practices.

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Type of sound	Function	Link to Schafer's soundscape	Corresponding type of sonic installation in literature	Differences among them
Sound-as-machinery	Mainly present in scientific museums as the matching sound that accompanies visitors' actions during their discovery journey. Otherwise, as background sound, as ambiance that defines a sonic environment to set the atmosphere, or sometimes for naturally occurring sounds. In this sense, this is a basic level of sound.	Keynote sounds	Ambient soundscapes	Its double function: not only as just ambient background sound but also as sound that mimics and accentuates visitors' actions (this mainly in science museums).
Sound-as-space	It strengthens and heightens the museum experience that unfolds in space by being an essential element that defines it.	Sound signal	No clear correspondence among those listed	Sound is an eligible element of the story that is unfolding in space and effectively contributes to it. It remains in the background (but not in the same way as the earlier type of sound, i.e., sound-as-machinery) and it supports the story by contributing to the storyline, for example by emphasising the narrative arc.
Sound-as-storyteller	Oral narration, regardless of the ways in which this is delivered.	No clear correspondence	Sound as narrative	Contrary to the previous type of sound, here the sound is in the foreground and tells the story. The main difference with existing categories is in the attention that is given to the emergent use of AI-generated conversations, that seem to represent an area in fast development whose implications are yet to be investigated.

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Table 1:
Sound classification.

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Conclusion

This article discusses how sound is not merely supplementary, an add-on, a nice-to-have, to museum experiences but how it can fundamentally transform how visitors engage with collections, spaces and, most importantly, narratives in museums. Museums that thoughtfully integrate sonic elements, especially in the sound-as-storytelling form that was identified, create richer, more inclusive, and more emotionally powerful encounters with cultural heritage.

This article presents a taxonomy of possible sound uses in museums, based on a few real-life cases. In developing this taxonomy of sound types, Schafer's work on the concept of soundscape provides fundamental foundations and references.

The main difference with it, and with the sound types reported in the literature section above, is sound-as-storyteller, and in particular its AI-centred form.

This is where research is still limited because this practice is still in its infancy. But more research will be needed since more and more museums are investing in and working with generative AI.

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Endnotes:

1 Beauchamp, Jagodzińska 2025.

2 See, among others, Calvi, Vermeeren, Sabiescu 2025.

3 Luo, Doucé, Nys 2024.

4 Schafer 1977.

5 Schafer 1977.

6 Schafer 1977.

7 Schafer 1977.

8 Classen, Howes 2006.

9 As already discussed in Schafer 1977.

10 See, for example, in de Carvalho 2025.

11 Zhang 2025.

12 Wakkary, Hatala 2007.

13 Bitgood 2006.

14 Droumeva 2017.

15 Dudley 2010.

16 Bagnall 2003.

17 Mesquita, Carneiro 2016.

18 Hutson, Hutson 2025.

19 Hover et al. 2025.

20 Bedford 2001.

21 Falk, Dierking 2000.

22 https://kmska.be/en/a-red-that-sings-masterpieces-by-ensor-wouters-and-schmalzigaug (last accessed on 08/07/2026)

23 This is a reference made by the local painter Jules Schmalzigaug to the vermilion red in Ruben's painting *Adoration of the Magi*, as described in the exhibition.

24 Schafer 1977.

25 Schafer 1977.

26 Calvi et al. 2024.

27 https://www.chocolatenation.be/en?gad_source=1&gad_campaignid=21189367656&gclid=CjwKCAjwxITRBhBYEiwA6mZm7ZSHvc-q--jqmru9bkQAyR8jPkQEecDWxDWSAbbFRsqpHWdMfvsc3hoCiXkQAvD_BwE (last accessed on 08/07/2026).

28 See also in Calvi, Vermeeren 2024.

29 https://www.teamlab.art/ (last accessed on 08/07/2026).

30 Schafer 1977.

31 Yates, Løvlie 2024.

32 Yates, Løvlie 2024.

33 See Calvi 2026.

34 Hover et al. 2025.

35 See again Calvi 2026.

36 https://www.theartnewspaper.com/2025/11/19/in-his-own-words-antwerp-

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museum-recreates-magritte-lecture-using-ai (last accessed on 08/07/2026).

37 https://www.theartnewspaper.com/2025/11/19/in-his-own-words-antwerp-museum-recreates-magritte-lecture-using-ai (last accessed on 08/07/2026).

38 Schafer 1977.

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