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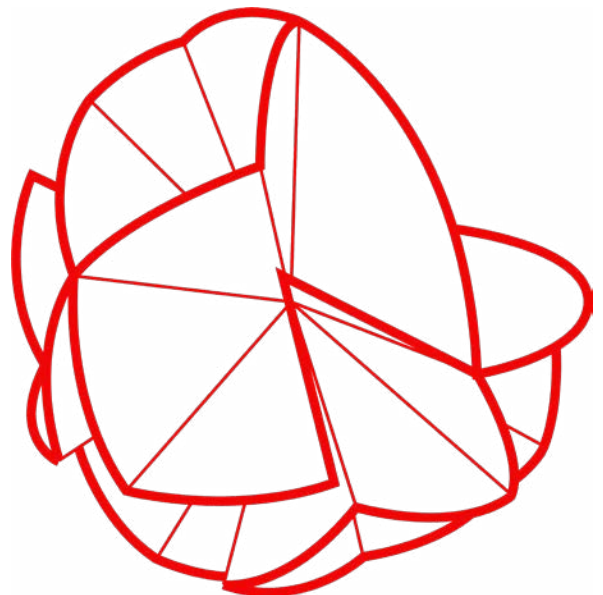
Disrupting Geographies in the Design World

Proceedings of the 8th International Forum of Design as a Process

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Perspectives of Sound: Promoting Social Inclusion Under the Principle of "Access for All" in Museums

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Abstract
It is predictable that the employment of sound in museums is inevitable for a multitude of different reasons. The contemporary museum's emphasis on experience and participation has urged a transformation of its cultural paradigm. Multi-sensory experiences that mix auditory, visual, and tactile elements have become increasingly common in museums. Meanwhile, new demands have been placed on the museum experience as it begins to extend beyond the museum itself. It is appropriate for designers to develop a more holistic perspective on the audience's connection to the exhibits and cultural content, which should also include consideration of sound content. This research examines inclusive construction in Lombardia museums through the perspective of sound. Inclusion is the starting point that sound can be engaged with, and sound contains other potentials to explore.

Introduction

Over the past decade, museums and society have developed into having a more intimate and cooperative relationship. The role of museums in society has expanded significantly as more and more studies have illuminated the fact that museums seek to embrace the community and the public rather than remain collection-centred (Vermeeren et al., 2018). And the growing concern on social inclusion agendas compelled museums to take a significantly broader perspective on how to serve diverse audiences (Hutchinson & Eardley, 2021). Meanwhile, today's museums are more than simply places for the collection and preservation of past or people visit, but where they gain experience and reach out to their culture and communities. Thanks to advances in technology and neuroscientific developments, it has become possible that sound can intervene in the museum experience in various ways to capture attention, create an atmosphere and convey information: as an object, as an interpretation tool, as a visitor engagement device (Hjortkjær, 2019; Wiens & de Visscher, 2019), and to enhance the overall inclusive museum experience (Brooks et al., 2019). Designers such as Studio Azzurro, Migliore&Servetto, NEO, DotDotDot, CameraNebbia, and Bottazzi broadly explored sound narratives and immersive potential as a means for accessibility. The sound acquired a crucial role in several works (e.g., Conserve the Sound, Essen; Electro-Elettronica: visioni&musica, Biennale CIMM, Mestre) and urban projects by Daan Roosegaarde, Emilio Stocchi, Richi Ferrero, to name but a few. This need for sound in museums is rooted in a facet that sound is an essential part of the human experience (Kannenberg, 2016). Both are a message that can convey historical rituals and knowledge and a sensorial approach to perception.

From one perspective, the field of inclusion studies has flourished as a result of the rise of social inclusion awareness. From another perspective though, little attention has been placed on the significance of sonic accessibility in social inclusion issues, as well as in the museum field (Renel, 2019). One reasons for this, shown by the emerging paradigm of aural diversity is that hearing is a hidden, invisible and inconspicuous form when compared to other external features of humans (ibid.). Therefore, it is often ignored in the design process. However, the diversity of human hearing is a ubiquitous issue related to millions of people, including different degrees of hearing loss related to age, neurological problems or other conditions (ibid.). Furthermore, Renel (2019) concluded that there were two distinct sonic barriers: structural sound barrier and psycho-emotional sonic barrier. Structural sound barriers are present in museums as representatives of the interrelationship between sound and environment, such as auditory navigation, localisation and way-finding (Renel, 2019; Reeve, 2019). Psycho-emotional sonic barriers are often produced by the personal experience of internalised oppression. In some examples, a certain sound can touch a person with sadness or discomfort. It is impossible for museums to identify all these barriers considering the fact that individuals respond differently to sound varying according to their own experiences (ibid.).

It is an acknowledged fact that museums should devote increasing importance to "access for all", including disabilities and other visitors (Schwartzman & Knowles, 2022; Leonard, 2010). Not

only is this a widespread consensus and vision of society and people in a wave of intellectual democratisation (Leandro et al., 2021), but museums are also motivated by their desire to expand their audiences to increase accessibility (Kannenberg, 2017). Usually, two aspects are involved in accessibility when it comes to museums. One is in terms of physical access, in that people can wander around museums relatively unobstructed and locate spots related to their interests without too much effort. Another means that people can access the content of museums and absorb knowledge by engaging with video, interactive stations, artefacts or any other narrative tools. (Eardley et al., 2016; Rieger et al., 2022).

It suggests that museums seek to create equal opportunities for all people to access both physical aspects and the content of museums. While there is often a beneficial intent to creating inclusive exhibits, the consequences of these special sets are not always positive. In some museums, inclusive exhibits are considered to be reserved for people with disabilities or people in need, given that disabilities can not have an identical approach to access these exhibits without inclusive interfaces. On another facet, "people not in need" are not allowed to experience inclusive exhibits prepared for people with disabilities with special content, which in a sense contradicts the principle of "access for all" (Eardley et al., 2016). Furthermore, it is considered that inclusive museum experiences are a coherent process, including the exploration of the museum environment, perception of the spatial atmosphere and the chance to hear the whispers of visitors instead of staying in a specific area with inclusive exhibits and engaging in an incomplete museum experience (Rieger et al., 2022). In this context, it is unacceptable for museums that add few inclusive exhibits to believe they can provide an equal or similar experience for all audiences. Returning back to the questions, ranging from the tendency about the social responsibility of museums via emerging sound practices in museums to new notions such as the aural diversity or sound barriers, many contemporary museums have invested in improving inclusivity at the expense of sometimes not allowing everyone access to all exhibits. While such perspectives have proven that sound/hearing is an indispensable aspect of museum inclusion and human experience, it seems that little research on the perspectives of sound adequately explore new possibilities in terms of museums toward social equality.

Methodology

The present study created an analysis and design tool referred to as "Exhibit sound score"/Partitura sonoro-allestitiva", in particular, it took into account a framework based on a qualitative analysis by Vaz et al.(2020), 'a framework must support integrating the different phases identified as relating to the experience of visiting cultural institutions: pre-visit, on-site visit, and post-visit'. Our team determined what constituted valuable research content and which other details to explore in different phases of the museum experience based on the literature review, and one of the researchers visited all the museums contained within the study to ensure that no meaningful content was missed. This tool aims to identify sonic barriers and analyse how sonic strategies were adopted for accessibility.

Exhibit section

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Typology of the
access

_____

Contents

_____

Exhibit artefacts

_____

Sound equipment

_____

Interaction

_____

Time

_____

Barrier

_____

Strategy

_____

It can also be used to design and verify new methods to empower the cultural experience through sounds. With an empirical study through the lens of the framework mentioned above, We selected these museums in the Lombardia region of Italy that belong to AM network (Abonamento Musei Network) to provide observations and comparison, analyse the current sonic barriers and position the proper sound strategies adopted by the museums. The reason we chose AM network is that the Lombardia region is endowed with a magnificent cultural heritage and AM network intends to raise awareness of this cultural heritage and enhance Lombardia territorial networks through the museum cards they provided. The cards aim to give audiences free access to museums whenever they choose within the Lombardia region. In order for exploration to be dynamic and flexible, the contents and methods of this study for the three visit phases highlighted varied concerns and were executed in appro-priate forms. In the pre-visit phase, when audiences begin to form ideas about visiting the museum, they usually access information channels such as the official website and social media to find out about the museum site, exhibition theme or any other important information. Here we only investigate official information sources the museum-self provides, such as the museum's website or app. This research concentrates on these museums with high-value gradients of sound and audiovisual content during the on-site visit phase. One of the researchers visited all these museums to locate sonic barriers,

both structural and psycho-emotional, in different visit phases that have a significant impact and to observe the effects of sound accessibility on the overall accessibility of the museum. It also aims to collate strategies for sound design and narrative that promote accessibility in museums and assess their power to reach different audiences. Semi-structured interviews were conducted with the museum managers or the staff responsible for accessibility during the on-site visit and were intended to obtain information that is inaccessible or ignored but valuable for enhancing accessibility in museums.

Result and discussion

Pre-visit phase

The museum experience begins when the initial desire to visit museums arises. Some audiences seek to obtain broad information and initial impressions of museums through different channels, also known as the pre-visit phase. In exploring and researching this phase, it is worthy of note that podcasts have proven to be an effective way to deliver the museum experience into the home to increase the accessibility of knowledge and foster audiences' interest in museums, particularly in times of social chaos such as the pandemic (Levin, 2020).

Museo Teatrale Alla Scala and *Museo Interattivo Del Cinema* offer podcasts that explain the museum from various perspectives and provoke curiosity. Audiences can discover the virtual exhibition and the Museo HUB+ digital centre that rely in large part on sound archives and vocal narratives to convey its content on the official website, with content that covers museum architecture and urban planning, the museum's history, and the theatre's past and precious collections in various times. On the one hand, *Museo Teatrale Alla Scala* has resisted confining itself solely inside the label of museum. They intend to revive the former function of this building as a cultural salon and to invite audiences into the extensive collection and sound content preserved within the museum, whether physical or digital. It aims to explore and debate music, theatre and social issues and reflect on the complex relationship between theatre, cultural identity and urban history. On the other hand, visitors can quickly build an awareness of the museum's marvels and access its authentic core spirit through the narrator's touching descriptions and original voices from days gone by.

On-site visit phase

It is appropriate to highlight a new perspective on the epistemology of museum inclusion before we discuss the sound strategies during the on-site visit phase. The museum experience is an ongoing process, and the arrival at inclusion is not dependent on creating an inclusive product in the museum (Rieger et al., 2022). Inclusive design in museums is a mission that requires taking into account all types of audiences, from the visually disabled, the physically disabled, and the learning disabled to those of different languages

and nationalities, all of which have distinct and specific demands on inclusive design. Museum accessibility is not exclusively confined to creating new inclusive settings but also includes adding new channels to existing content and exhibits so that visitors can receive them through different channels. Sound can be a medium to facilitate diverse information delivery and wider content accessibility. In this context, we seek to redefine the scope of our research. Instead of focusing on sound strategies with an exclusive emphasis on inclusivity, the study examines sound-related strategies at each touchpoint and communication channel throughout the exhibition experience and explores how these strategies can better contribute to narratives and increase accessibility.

Several exhibitions accompany the environment with open background sounds to convey meaning and emotion. In the *Museo Nazionale della Scienza e della Tecnologia Leonardo da Vinci*, before audiences even enter the *'Leonardo da Vinci Galleries'* exhibition, they can hear the soundscape mixed of bird calls, animal sounds and roars, which corresponds to the theme of the area - how Leonardo da Vinci invented instruments through the observation of animals. The gears on display in another area interplay with the sound of gears clashing. Similar designs include the sounds of horses galloping and hymns of war and battle used to accompany the military structures in the exhibition. In this way, it does not narrate the specific content by dialogue. Still, audiences can easily be infected by the atmosphere in the sound and unconsciously generate associations and memories, considering that the dissemination of sound is invasive when compared to the audience actively viewing and searching for information. Memories and testimonies are some of the most prominent keywords in *Casa Milan - Museo Mondo Milan.* The museum's Golden Trophy Gallery with an immersive experience that narrates the glorious moments of AC Milan. The exhibition room falls into darkness and calm as the lights switch off at the beginning of the experience. A small circular screen situated in the centre of the ceiling showed a video about the AC Milan match, alongside the crowd's cheering, the players' screams and applause slowly. The progression of sound layers brings the audience to a crescendo as the lights twinkle in response to the changing sounds. The lights all come on at the end of the play, and it takes the audience with more excitement back to the winning moment to perceive this unique trophy room in the world. Sometimes, hearing integrates everything better than other senses in the construction of sensory worlds, and sound can metaphorically contextualise and thematise the exhibit to lead the audience to immerse themselves in the scene. One of the features of *Museo Interattivo Del Cinema* is the AR reality that audiences can scan the selected object by iPad to animate a static poster into animation with a living, vibrant soundtrack. The designer defines the various sound materials according to the development of the narrative structure through differences in pitch, timbre and type, such as dialogue, monologues, ambient sounds, special sound effects, etc. The combination of sound material provides the aural context for the story to support its narration through sound. The dynamic changes in sound facilitate the audience to catch the narrative focus from brief clips in the AR experience considering the original film can take 1-2

hours to consume in its entirety. Moreover, sound is more suitable for conveying more abstract, intangible and ambiguous meanings to increase sensory accessibility, especially to express vague and sharp emotions.

The audio guide is one of the common accessibility facilities in museums today and helps people identify clues by translating visual content into objective, easy-to-understand language (Hutchinson & Eardley, 2020). It demonstrated that audio guides could promote learning in museums for people with learning disabilities and autistic groups (Vaughn et al., 2020). Some museums consider audio guides to be an advantageous tool to attract visitors. The *Museo Teatrale Alla Scala* set up billboards to promote the museum's audio guide, and the staff also reminded and informed audiences how to listen to it. The *Leonardo3 Museum* in the city centre is one of the most frequented destinations for foreign tourists. They offer an audio guide in eight different languages to help visitors of different languages understand the museum content, considering that the visual content is only available in Italian and English. It is not sufficient for museums to claim to be accessible if they are only equipped with audio guides (Michelini, 2020). The audio guide should flow naturally into its surroundings to encourage the audience to further explore meaning. The audio descriptions are more concise and flexible than the audio guides typically available on the device or mobile app. Some audio descriptions involve audiences actively engaging with the experience, and these installations offer a diverse range of options to cater for different types of audiences. The *Nutrition #FOODPEOPLE* exhibition includes a sound installation in the form of an Italian map, with a button on each region where the audience can select one region and press the button to listen to information about it. The *Museo Interattivo Del Cinema* offers an interactive cabinet with three rows of transparent bricks. Audiences can place one brick in an inductive position and select a film clip to play. Some sound installations hide in the museum for audiences to encounter them unexpectedly. In the *Leonardo da Vinci Galleries* exhibition, the screen lights up as the audiences approach the installation and the man on the screen appears and draws the audience into the story with a sincere voice.

Fig. 2
Yi Zhang, Raffaella Trocchianesi, Exhibit sound score/Partitura sonoro-allestitiva for AM network.

Other installations use sound as an entry point for interactive games, such as the installation on the first floor of the *Museo Interattivo Del Cinema*, which simulates the process of dubbing a film with four different colours cubes that represent four different types of sound: percussion, explosion, human voice and music, and these sounds can combine to create various sound effects.

It observes that the realisation of the sound is not complicated based on a review of sonic production and combination. However, the combination of stereo, handset and headphones to form a sound system still needs to be adapted to the acoustic conditions of the space. We identified a few representative sound barriers that can be avoided by the use of proper design. The area in the *Leonardo da Vinci Galleries* exhibition is unusually high and domed, resulting in heavy sound reverberation. In the same exhibition, two videos are played in close proximity, which results in the sound sources being very close together and affecting audio clarity. Since the museum has decided not to maintain the traditional silent model, it is also necessary to confront the side effect generated from the enthusiastic response of the audience encouraged by sound, that is, noise. In the *Nutrition#FOODPEOPLE* exhibition, children gathered around the interactive table and loudly showed off their discoveries, the sound travelling through the confined room causing other audiences to scurry away to escape the screams of the children. Sometimes, sound can trigger inexplicable emotions such as sadness and anxiety (Rais, 2012), and it is suggested that the impact of sound on accessibility is far more complex than previously imagined (Beliveau, 2015).

Post-visit phase

Not all museums have made efforts in the post-visit phase, although some chose ways such as weekly newsletters or souvenirs to build connections, enhance audiences' long-term memories and to foster potential engagement and future visits. This study attempted to capture the strategies in this phase via the museum website, social media, and other approaches presented by the situation above. It is evident that the museum did not make some sound-related investments during the post-visit phase.

Conclusion

Exhibition design is a complex team task that requires a combination of geometric, material, interactive, lighting and multi-sensory elements, and the sound that interacts with these elements can create a fantastic exhibition effect. Sound design strategies evolve in a contextual and holistic manner, furthermore, designers should foster an awareness of sound sensitivity to exploit sound and increase access to sound. The museum started to break away from its original silent mode and transform into an interactive, hybrid entertainment and education centre (Baker et al., 2016). One of the inevitable consequences are new requirements to use sound in exhibitions. Nowa-