EXHIBITING RADIO SOUND

TRANSFORMING THE EXHIBITION SPACE INTO AN AUDITORIUM[1]

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Abstract/Zusammenfassung

Exhibitions are traditionally visually oriented, and exhibiting radio heritage as audio artefacts requires a transformation of the exhibition space into an auditorium as a *listening space*. However, this auditorium should not be modelled on the fixed listening position of the concert hall. Instead, it should retain the free-choice immersive environment of exhibitions.

This article accounts for the design intentions of such a transformation and follows with an examination of observations and reported experiences from visitors. Inspired by Pierre Schaeffer's dual concept of the *sound object* and *reduced listening*, it is suggested that this foregrounding of sound in exhibitions entails both a phenomenological concept of museum artefacts and an exhibition design that enables focused listening as audio artefacts are objects of perception constituted in situ.

The study shows that exhibition elements aid the atmospheric and immersive listening experiences of visitors. The listening experience is subjective, as it can trigger personal memories, but the emotional responses of visitors are not entirely idiosyncratic.

I argue that transforming the exhibition into a listening space provides an engaging platform for disseminating radio heritage as audio artefacts. In addition, such a transformation can broaden the visitors' conception of what kinds of experiences the museum exhibition can provide.

Ausstellungen sind traditionell eher visuell orientiert, doch benötigt eine Ausstellung des Radio-Erbes als auditive Artefakte eine Transformation des Ausstellungsraumes in ein Auditorium – in einen Hörraum. Allerdings sollte dieses Auditorium nicht nach den festgelegten Hörpositionen einer Konzerthalle modelliert werden. Stattdessen sollte es die Möglichkeit des freien Eintauchens beibehalten, wie es in traditionellen Ausstellungen auch gegeben ist.

1 The author would like to thank his colleagues Heidi Svømmekjær and Vitus Vestergaard for their invaluable help with this project. Heidi's research on radio history was the foundation for this exhibition, and she managed all the copywriting and collecting of illustrations for the catalogue. Vitus was the technological mastermind behind Exaudimus. Also, the help of Elizabeth Landbo from Snitkergroup in conducting the visitor study and transcribing the interviews should be acknowledged. Finally, the author is grateful to the Danish Agency for Culture for funding the visitor study and to the LARM Audio Research Archive for funding the overall research project, Displaying Sound: Radio as Intangible Heritage in a Museological Context.

Der Artikel beschreibt die Designvorgaben für eine solche Transformation, indem er geschilderte Beobachtungen und Erfahrungen von Besuchern untersucht. Inspiriert durch Pierre Schaffers duales Konzept des sound object und reduced listening wird angenommen, dass die Vordergründigkeit des Sounds zum einen ein phänomenoloogisches Konzept von Ausstellungsstücken beinhaltet und zum anderen ein Ausstellungsdesign mit sich bringt, das fokussiertes Zuhören von auditiven Artefakten als Objekten erlaubt.

Die durchgeführte Studie zeigt, dass Ausstellungselemente das atmosphärische und immersive Erleben der Besucher unterstützen. Das Hörerlebnis ist zwar subjektiv, da persönliche Erinnerungen getriggert werden können, es zeigt sich aber, dass die emotionalen Reaktionen der Besucher nicht komplett verschieden sind. Ich vermute daher, dass die Transformation der Ausstellung in einen Hörraum eine Plattform dafür bereitstellt, das Radio-Erbe als auditive Artefakte zu verbreiten.

Introduction

> It was like entering a gallery, but every picture that you looked at was a sound clip! And I have not experienced that before! (David, 41)

Regarding sound, such as radio heritage, as artefacts to be exhibited in a museum context presents a series of curatorial challenges. Elsewhere, I have touched upon the general challenges regarding delineating, collecting, documenting and preserving sound artefacts (see Mortensen 2013). Here, I adopted a more Cartesian view of sound artefacts as objects that could be collected, stored and preserved by museums. However, in this article I wish to develop a phenomenological view of sound artefacts, inspired by Pierre Schaeffer's dual notion of the *sound object* and *reduced listening* in *Traité des Objets Musicaux* (1966).[1] Such a view is suitable for understanding the specific practical implications of designing an exhibition to be a platform for displaying audio artefacts and understanding the resulting experiences of the visitors. Exhibitions are traditionally a visually oriented means of communication, and exhibiting radio heritage entails a transformation of the exhibition space into an auditorium in the original Latin meaning of the term; it is transformed into a *listening space*. This means a reversal of the usual relationship between the material objects as primary and sound as secondary in exhibitions (e.g. an audio guide or a soundscape). In order for this foregrounding of sound to occur, a change in the perceptions of the visitors is also required: a change of focus from the visual to the auditive. This process could also be described as a change from hearing to listening, where listening is an intended activity, while hearing is just a passive registration of the surrounding auditive environment (see Brown 2010: 130). Thus, the exhibition design should enable this perceptual change and support focused listening. This notion of focused listening does not correspond directly to Schaeffer's reduced listening, but we used similar deconditioning techniques to enable the radio artefacts to appear as sound objects for the visitors, as expressed by David in the introductory quote.

In the literature on museum studies there is a recurrent call for deep studies of the interface between the exhibition design and the visitor that examine the environmental opportunities available to visitors as well as the experiences that result from those opportunities (see Roppola 2012: 49–50). This article offers such a study by presenting both design intentions and visitor experiences in a listening exhibition. The implemented design strategies are accounted for, followed by an examination of the observations and reports of visitors. The element of sound is foregrounded when transforming the exhibition space into an auditorium. Thus, the article will focus on listening experiences and their immersive and atmospheric qualities.

The kind of auditorium resulting from a transformation of the exhibition space should not be modelled on the modern concert hall as a listening place, with its frontal orientation and fixed listening position bifurcating the space into separate

1 The author is not proficient in French and has been unable to obtain an English translation of this work. Therefore, he relies upon Michel Chion's *Guide to sound objects: Pierre Schaeffer and musical research* (1983) for an account of Schaeffer's position.

sections for performance and for listening (see Rogers 2013: 91). Instead, the exhibition should retain its character as a free-choice environment that provides the visitor with the agency to shape a coherent experience (see Roppola 2012: 168). Listening is a more immersive experience than viewing, as the nature of sound is absorbing and omnidirectional, while the visual perspective is focused and targeted (Brown, 2010: 1). Sound is even hailed as the «immersive medium par excellence» (Dyson 2009: 4). Therefore, we designed an experimental exhibition of radio heritage around the immersive experience of using your body as a tuning dial as we know them from analogue radio sets. In the exhibition *You are what you hear*[2], you can locate different radio soundtracks in the exhibition space by moving around and positioning your body according to the props that constitute the mise-en-scene of the exhibition (e.g. lying on the bed or sitting on the bicycle). Several features of the sound design correspond to the *sonic effects* identified by Augoyard and Torgue in their catalogue *Sonic Experience: A Guide to Everyday Sounds* (2006). I will use their terminology to explicate these features as a background for understanding the visitors listening experiences.

Following these introductory remarks, in the next section I will develop a phenomenological concept of audio artefacts as being constituted by the focused listening of visitors in situ. Here, I will also account for the exhibition's design elements and deconditioning techniques, which enable focused listening. The listening exhibition was intended as an immersive experience, so in Section 3 I will describe the immersive experiences envisioned for the visitors and the immersive strategies we employed in the exhibition's design. Then, before the Findings section there will be a brief section outlining the method for studying the visitors and collecting the data. Rather than including a separate section for the discussion, the points for discussion are incorporated into the Findings section, where appropriate.

2 The listening exhibition *You are what you hear* was held at the Media Museum in Odense, Denmark. The exhibition ran from October 2012 until January 2013. The author acted as curator and project manager for the project.

Enabling focused listening and constituting audio artefacts

The exhibition as an auditorium should be a stage on which sound can appear to the visitor as audio artefacts. This sets some particular requirements for the exhibition design. First, the design should provide a technological platform for delivering the audio artefacts. Second, the design should enable the visitors to focus their listening. Third, the design should foreground sound by reducing the visual aspects of the exhibition.

The aim of the listening exhibition was to disseminate radio sound in a novel fashion by displaying it as audio artefacts distributed across an exhibition space rather than providing radio sound through a listening kiosk. To this end, we designed the system, *Exaudimus*, as the technological platform for the exhibition. *Exaudimus* enabled us to send a soundtrack to four individual headsets simultaneously depending upon their location within the gallery space. Further, *Exaudimus* was designed to support the conceptual metaphor of *embodied tuning*. We wanted the visitors to use their body as a tuning dial when moving about the gallery. To achieve this effect, the default sound in the headsets was static noise, which gradually crossfaded into an audio artefact when the visitor approached one of the predefined sound spots in the gallery. For a more detailed account of *Exaudimus* and embodied tuning, see Mortensen and Vestergaard (2013). Exaudimus established a layer of augmented reality throughout the gallery, creating the illusion that the sound of the audio artefacts was coming from the props in the exhibition (i.e. the furniture). So when the visitor lay on the bed or sat on the bicycle, he or she received a dry signal.[3] This kind of auditive illusion is identified as the sonic effect of *delocalisation* introduced by Augoyard and Torgue. The listener knows exactly where the sound *seems* to come from, but is simultaneously aware that this is an illusion as the sound is actually coming from the headset (see Augoyard & Torgue 2006: 38).

The metaphor of embodied tuning is supported by a combination of several other sonic effects, namely, *imitation, quotation, coupling* and *crossfading*. *Exaudimus imitates* the stylistic features of fine-tuning on an analogue radio set by *coupling*

3 A short proof of concept film of *Exaudimus* is available here: http://wp.me/p1uGlo-4h [15.08.2014].

the audio artefacts with static noise via *crossfading* (see Augoyard & Torgue 2006: 29, 59). Therefore, the effectiveness of the metaphor structuring the visitor experience is dependent upon the visitor's recognition of these features as cultural codes for radio fine-tuning, which are not associated with listening to contemporary digital radio. This became evident when several visitors assumed the headset was broken upon hearing the static. The audio artefacts themselves are not imitations but *quotations* as fragments of actual broadcasts (see Augoyard & Torgue 2006: 86). In addition, their status as quotations is highlighted by accompanying signs identifying the original source (i.e. metadata on the labels). The imitation effect is a function of style, while the quotation effect is a function of content.

We can qualify the attitude of focused listening we wanted to cultivate in our visitors by comparing it to Pierre Schaeffer's similar concept of *reduced listening*. Schaeffer himself commented on the fundamental acousmatic nature of radio sound. According to Schaeffer, the acousmatic situation, in which the source of the sound is concealed, is a favourable condition for reduced listening as the sound can be focused on as a *sound object* independent of its cause or meaning. The concealment of the source can be by proxy, such as a radio set or loudspeaker. This dissociation of sound from its cause and semantic meaning can be furthered by the repetition of the sound fragment (see Chion 1983: 11). Schaeffer develops a phenomenological concept of a sound which is not a simple translation of the physical signal; instead, the perceived sound is a correlation between the signal and listening intention. Reduced listening is a certain kind of listening intention that constitutes sound as an object in itself, not just as a vehicle for meaning, as in ordinary listening. Thus, a sound object in Schaeffer's sense does not exist independently of a listener (see Chion 1983: 30–32).

The audio artefacts in our exhibition are not comparable to sound objects in a strict Schaefferian sense, as they are more composite objects; however, we used similar techniques in order to ‹objectify› the sound and enable a form of reduced listening for the visitors. Firstly, a main point of the exhibition was to foreground segments of ordinary flow radio, which is produced to play in the background, thus bringing attention to this kind of radio sound. This foregrounding could also be characterised in terms of the *decontextualisation* of the original broadcast material (see Augoyard & Torgue 2006: 37). This recontextualisation of broadcast material as exhibition artefacts enhances the acousmatic experience of listening to radio, an experience which is further enhanced by the delocalisation effect resulting from the augmented reality created by *Exaudimus* (Augoyard & Torgue 2006: 38). Secondly, we reduced semantic listening by using segments of only two min. duration, rather than entire radio shows, which would constitute a semantic unit. Thirdly, we tried ‹fixing› the sound as an object by replaying in a constant loop. Fourthly, while headsets are often regarded as a necessary evil when introducing sound in exhibitions, because they can be an ‹eyesore› and hinder social interaction between visitors, they can have the effect of focusing the visitor's attention by minimising external distractions. According to R. Murray Schafer, headphones cause the sound to emanate within the head of the listener, and therefore headphones augment concentrated listening (see Dyson 2009: 81). Museum visitors also report that they feel more immersed in the exhibition content through a headset than via loudspeakers (see Roppola 2012: 199). However, Schmidt comments that listening via headphones seldom creates a separate internal field of sound, as the sound will integrate itself with the surrounding sonic environment depending on how tightly fitting the headphones are (see Schmidt 2013: 107). For this reason, we chose a tightly fitting headset in order to exclude, or at least minimise, the influence of the aural architecture of the gallery space on the listening experience.[4]

These deconditioning techniques all contribute to a distancing of the listening experience from ordinary listening, and thus enable a more focused listening similar to Schaeffer's reduced listening, which constitutes the sound as audio artefacts in situ when the visitors are listening. The listening experience, with its attendant personal memories and emotional responses, is thus co-created when the visitor encounters an audio artefact in the exhibition environment (see Roppola 2012: 59).

4 Blesser and Salter (2007) define aural architecture as the properties of space that can be experienced by listening in *Spaces Speak, Are You Listening? Experiencing Aural Architecture.*

Immersive strategies for transforming the exhibition into an auditorium

The literal meaning of immersion is to be plunged and submerged in liquid. However, it is also used in a transferred and figurative sense: being absorbed in some condition, action, interest, etc. (see OED 2013). Thus, the experience of immersion could be a bodily or mental experience (or both). According to Murray, «we seek the same feeling from a psychologically immersive experience that we do from a plunge in the ocean or swimming pool: the sensation of being surrounded by a completely different reality, as different as water is from air, that takes over all our attention, our whole perceptual apparatus» (1997: 98). Morse further distinguishes between immersion as a metaphor for a state of mind and a descriptor for «cultural forms and techniques thought to induce that state» (Morse, 2003: 1). Museum exhibitions are such a cultural form and utilise a wealth of techniques to create immersive experiences for visitors. On a general level, one can distinguish between exhibits that are reconstituting, creating or interpreting a reference world. *Reconstituting* exhibits aim at recreating an external reference world as authentically as possible (e.g. a life-sized streetscape). Exhibits of the *creating* type create a fictitious environment (e.g. a tunnel enabling visitors to explore the five senses). The third exhibit type *interprets* an existing reference world in an indicative or symbolic way (e.g. a walk-through model of the human heart) (see Roppola 2012: 32). The listening exhibition under consideration falls into the interpretative category. According to Roppola, the interpretive exhibit type is especially useful for catalysing abstract experiences. This is the case when we use embodied tuning as a conceptual metaphor for exhibiting radio sound, as listening to radio would not normally involve ‹channel-hopping› by repositioning your body.

In the following, I will give an account of the immersive experiences envisioned for the visitors and the immersive strategies we employed in the listening exhibition. First, I will account for the listening experience provided by *Exaudimus* using the vocabulary of sonic effects of Augoyard and Torgue. Then, I will account for the spatial strategies we employed, and then the semantic strategy of *mental imagining* we used on the interpretative labels. Finally, I will account for the performance aspect of the exhibition.

Augoyard and Torgue define the sonic effect of *immersion* as «the dominance of a sonic micromilieu that takes precedence over a distant or secondary perceptive field» (2006: 64). From the moment they put on headsets in the exhibition, the visitors are immersed in a sea of static noise from which the audio artefacts appear when the visitor approaches one of the designated sound spots. This appearance could be further characterised by the *emergence* of a *niche* as «an occurrence of a sound emission at the moment that is the most favourable and that offers a particularly well-adapted place for its expression» (Augoyard & Torgue 2006: 47, 78). For example, a pedestrian walking on a street with dense traffic will wait for a moment of relative calmness in the stream of cars (i.e. a niche) to hail someone on the other side of the street. In the listening exhibition, this niche effect is artificially produced, as it is pre-programmed into *Exaudimus*. As the visitor approaches the sound spot, the static noise will gradually crossfade into the audio artefact. Once the visitor reaches the sound spot (a sphere approximately 1 m in diameter), the static noise is cut out and the visitor gets a dry signal to achieve the optimal appreciation of the audio artefact and the feeling of immersion. Augoyard and Torgue characterise this feeling as the sonic effect of *envelopment*: «The feeling of being surrounded by a body of sound that has the capacity to create an autonomous whole, that predominates over other circumstantial features of the moment [...] The accomplishment of this effect is marked by enjoyment, with no need to question the origin of the sound» (2006: 47).

We chose a headset-based solution to support the focused listening of the visitors. But the sound that plays in the headphones, which is so ubiquitously present in museums, is rarely designed for headphones, as pointed out by Stankievech. Therefore, the potential for creating spatialised sound (e.g. with binaural recordings) is not fully utilised (see Stankievech 2007: 57). This was also the case in our listening exhibition because the audio artefacts consisted of original broadcast material. So, the sound playing in the headsets was in stereo, which created a reduced experience of spatiality while listening. However, compared to mono sound, stereo sound has a more surrounding effect because it simulates a horizontal auditive space. Thus, a two-dimensional spatiality is created along an imaginary axis between the ears (see Schmidt 2013: 102). The consequence for the

listening experience was that the visitor could only determine their proximity to an audio artefact, not specifically where the audio artefact was located in relation to their body. This resulted in a more groping approach when the visitors tried to ‹tune in› to the audio artefacts by moving their bodies.

We intended the exhibition space of the listening exhibition to be radically different from the rest of the surrounding museum, and wanted entering the gallery to be like ‹plunging into another world›. Therefore, we curtained off the gallery space with a large portal shaped like a transistor radio set. The visitors had to pass through the black curtain of the portal to enter the exhibition, thereby signifying that they had entered another narrative universe separate from the reality outside. The darkness was a way to reduce the visual stimuli of the gallery space and focus the visitors' attention on listening. In addition, darkness is a powerful technique for establishing mood and creating the feeling of immersion, as noted by Roland Barthes in relation to cinema (1989). For Barthes, awareness of the immersive experience becomes acute when he leaves the darkened theatre and encounters daylight, but we intended the reverse transitional experience for the visitor, who should become aware of an immersive experience when leaving the brightly lit corridor and entering the darkened gallery.

According to the *Mood-Cue Approach*, the primary emotive effect of a film's structure is to create a mood as a predisposition to experiencing emotion, as «mood encourages us to experience emotion, and experiencing emotions encourages us to continue in the present mood» (Smith 2003: 42). Likewise, we intended the overall exhibition design to establish a mood from which the inherent mood cues of each audio artefact would trigger an emotional response in the visitor, which would perhaps be prompted by the mood cues provided by the exhibition's labels. In a similar vein, Gernot Böhme characterises the effect of being present in a space (e.g. an exhibition) as being involved in a space of moods: «The space of moods is physical expanse, in so far as it involves me affectively. The space of moods is atmospheric space, that is, a certain mental or emotive tone permeating a particular environment, and it is also the atmosphere spreading spatially about me, in which I participate through my mood» (2002: 5). Following Böhme, the aesthetic work of designing atmospheres «consists of giving things, environments or also the human being such properties from which something can proceed. That is, it is a question of ‹making› atmospheres through work on an object» (1993: 123). Thus, the overall exhibition design should provide a mood that enables the visitor to experience the atmosphere, as a mental or emotive tone, of each audio artefact. Other than the darkened gallery, this intention resulted in minimalistic exhibition architecture, with each listening situation recreated symbolically with a few props as opposed to entire interiors. Finally, we kept most of the contextual and interpretative information in a catalogue, which the visitors could take with them afterwards to study at their leisure. This reduced the necessity of reading information in the exhibition.

The only text present in the exhibition consisted of interpretative labels mounted on columns by each listening situation. The labels were intended to serve four distinct functions: 1) to signify the status of a museum artefact; 2) to set the scene and mood of the listening situation; 3) to provide the metadata for the artefact (i.e. title, channel, broadcast date and participants); and 4) to invite the visitor to perform an activity. The interpretative label is a museological convention that signifies the status of a museum artefact in relation to other objects in the exhibition environment (see Witcomb 2007: 40). Thus, by giving each audio artefact a label, we convey to the visitor that the sounds were the main artefacts of the exhibition. We used mental imagery to realise the second function. Bitgood suggested that in addition to acting as a mood-cue, mental imagery could contribute to immersive experiences (see 2011a: 181). The wording of the label should put the visitor in an appropriate frame of mind if it is read before listening to the artefact, and it should explain the narrative context if read after listening. Below is an example of mental imagining for the artefact (the *Electrical Barometer*, a youth show):

Sunday evenings are full of melancholy. The weekend parties are over and a long week of lectures looms in the future. However, before Monday it is time to dream yourself away with The Electrical Barometer. Alone in your room but together with thousands of other listeners. The bed is yours, if you will join in.

(Heidi Svømmekjær, excerpt from label, You are what you hear)

The text provides the time and place in which the artefact is intended to be heard (a teenager's room on any given Sunday evening), as well as

the general mood of the situation (melancholic, because the weekend has passed and the week looms ahead). In addition, it reminds the visitor of the imagined community of listeners, which was an important part of the show and would have been known and apparent to a listener of the original broadcast, but might not be known and apparent to a visitor listening alone in the exhibition. It could be argued that having interpretative labels in the exhibition has counter-immersive effects. They add another element to the exhibition which competes for the visitor's attention, and they shatter the immersive illusion by introducing an interpretative meta-layer of information to the experience (see Bitgood 2011b: 112). In regard to the audio artefacts, this reintroduction of semantic meaning identifying the source and nature of the artefacts could counteract the attitude of focused listening to the audio artefacts as sound objects. Larsen (2002) has addressed the issue of labels as an intrusion. Her visitor studies showed that all 72 interviewed visitors preferred the exhibition with labels. Two-thirds expressed that they liked knowing what they were looking at. Larsen concluded that a lack of interpretative information limited the success of the immersive exhibit (see 2002: 15). In a similar vein, Bitgood speculated that the design of the labels determines whether they enhance or detract from the immersive experience. If the labels help focus the attention on the important and interesting aspects of given artefacts, they might enhance the feeling of immersion, while labels with unrelated content just serve to distract the visitor from the immersive experience (see Bitgood 2011a: 186). I consider aiding the visitors to focus their attention on the relevant aspects of a given artefact in this way to be a form of instructional scaffolding (see Wood et al. 1976: 89); not in the strict sense of didactic strategies, as suggested by Wood et al., but as a general metaphor for providing interpretative support for the visitors when engaging with the artefacts, if needed (see Mortensen 2013: 27).

This scaffolding through mood cues can also be considered to be a form of *gesturing atmospheres*, as suggested by Albertsen (2012). Evoking Wittgenstein's concept of gesture, Albertsen argues for the possibility of transporting atmospheres to other places and times through such gestures: «Rather than keeping an undistorted constant in different media, the key is the ability of the mediating chain to make the atmospheric experience present again, not in the sense of re-presenting it exactly as it once was, but in the sense of presenting it ‹anew›» (Albertsen 2012: 73). Gestures are not necessarily verbal; they can take any form, as they are multimodal ways of directing attention and understanding. Thus, the lighting, audio artefacts, focused listening, props, labels and performances of the listening situation should be considered to be gestures that enable the atmosphere of the audio artefact to present itself for the visitor. Albertsen acknowledges that there is no guarantee that the recipients will pick up on the mood cues and experience the intended atmosphere. The atmospheric experience intended for each of the audio artefacts does not correspond to a previously experienced atmosphere in situ. They are based on the informed, but nonetheless imaginary, conceptualisations of the curatorial team regarding ›how it could have been listening to this segment in that situation'.

Finally, we introduced performance as an aspect of each listening situation. The activity element, in which the visitor enacts the situation while simultaneously listening, was a strategy to strengthen the feeling of immersion. We assumed that visitors, through their bodily performances, would be more absorbed in the situation and therefore would listen differently and perhaps even reflect more upon the relationship between audio artefact and situation.

Method and data collection

The data supporting this study was collected in a gallery setting with the participation of regular paying visitors. Galleries constitute a rich environment in which to study visitor conduct (see Semper 1998: 120; Lehn et al. 2001). The actual location is critical for examining the visitor's subjective experience of immersion and atmosphere, which is the focus of this study, and which could not be recreated in a laboratory setting. In this case, the research site was a gallery space of approximately 100 square meters with an exhibition that consisted of seven exhibits, or listening situations. Each exhibit had the same overall form: an audio artefact, a text label mounted on an orange pillar, a few furniture props and an intended performance the visitor could participate in.

To examine how visitors experienced the listening exhibition, we conducted a small-scale visitor study. We observed 35 participants in the exhibi-

tion. The observer timed each visit, tracked the visitor's route through the exhibition and noted the sequence of events at each listening situation (e.g. whether the label was read before or after listening). Any notable non-verbal expressions and opinions voiced during the visit were also noted. All this information was recorded on a schematic floor plan of the exhibition. Of the observations, 12 were followed by a structured qualitative exit interview consisting of 17 open-ended questions. [5] According to Morse, six participants are adequate for eliciting in-depth reflections on the phenomenological essence of the experience (see 1994: 225).

The informants were approached and recruited just prior to entering the gallery. They were informed that the aim of the study was to observe ‹how visitors experience the exhibition›. The interviews were conducted at their convenience in an adjoining space following their exit. By cuing the informants in advance, we ran the risk of artificially heightening their engagement with the exhibition environment, as they might suspect that the interview would be a test of knowledge (see Bitgood 2011c), thus turning *real* visitors into *ideal* visitors (see Roppola 2012: 69). However, if we take the reading of labels as an indicator of heightened engagement, there was no difference between the visitors recruited for interviews and the visitors that were just observed. While all interviewees read most or all of the labels, this was also the case for the non-interviewees, save for three who read only some or none of the labels. This similarity is also apparent for the performance element, where about half of both interviewees and non-interviewees did most or all of the performances. Also, on average, there was no significant difference in the amount of time spent in the exhibition between interviewees (13.7 min.) and non-interviewees (12.9 min.), with a total range of 7 to 19 min. Thus, we feel confident that cuing the informants did not significantly alter their level of engagement.

The criteria for recruitment were equal representation of both sexes and diversity in age. We ended up with five male and seven female informants between the ages of 15 and 64. The author designed the interview guide in cooperation with an external usability lab, who then conducted the actual observations, interviews and transcription services. This division of labour assured a disinterested interviewer and uniform data across all interviews, but precluded the possibility for the researcher to probe especially interesting statements. For the sake of anonymity, the informants have been given pseudonyms.

Findings: Experiencing atmosphere and immersion

First, I will present the findings regarding the visitors' experience of atmosphere and immersion in the exhibition. Then, I will move on to the importance attributed to the different exhibition elements in scaffolding these experiences.

The gallery was curtained off from the rest of the museum, and entrance to the exhibition was intended to be a transitional experience:

> I thought that you passed through a kind of transition, where there were other people, and then into a bit more private atmosphere, where what happened was what you experienced yourself […] That you were part of the things that happened. *(Gudrun, 22)*

The atmosphere made Gudrun feel immersed in the exhibition. The dimly lit gallery was the most obvious difference from the brightly lit corridor from which you entered the exhibition, and the darkness made some visitors feel present and more aware of the atmosphere.

> It was quite intimate, and the darkness worked really well – because I closed off all other impressions. I was really there! *(Erica, 41)*

Darkness features prominently in the visitors' descriptions of the atmosphere in the exhibition, as seen in Figure 1.[6] However, «darkness» is coupled with different descriptors, such as «gloomy», «intimate» and «cosy», which indicates how the dark atmosphere resulted in different experiences for the visitors.

Half the informants described the atmosphere in positive terms, such as «lovely», «nice» and «cosy», while only two informants used the negative terms «gloomy» and «scary». The overall positive atmospheric impression on the visitors is important if we follow the intuitively plausible suggestion of Roppola: the positive ambience of a space can amplify visitors' engagement with the content of an exhibition (see 2012: 169). In a similar vein, the

5 Interviews were conducted in Danish. All quotes from the visitor study have been translated by the author.

6 There are only ten entries in the table because two informants did not answer this question.

1	Dark	Gloomy	Intimate	Lovely
2	Dark			
3	Dark	Intimate	Present	
4	Quite	No echo	Soundproof	
5	Private	Part of it		
6	Nice	Cosy	Calm	
7	Dark	Cosy		
8	Exciting	Cosy		
9	Subdued	Nice	Relaxing	
10	Scary			

1 Descriptors of atmosphere from individual visitors

Mood-cue approach also view mood and atmosphere as predispositions for certain emotions and experiences (see Smith 2003: 42). Two informants further described the atmosphere as «calm» and «relaxing», which supports the findings of Jan Packer and indicates the potential restorative effect of a museum environment. The ambient conditions and atmosphere were found to play a central role in restorative experiences for 43% of visitors (see Packer 2008: 50).

Three informants experienced the atmosphere as «intimate» and «private», and two further described being «present» and «part of it». Here, the tightly fitting headset appears to have a significant influence on the experience.

You were *alone* and it was different because you were wearing a headset, but it was not a headset with a guide speaking […] it was like you should be in the experience [Emphasis in interview]. *(Jenny, 25)*

Jenny expected the headset in the exhibition to be an audio guide, and was surprised that it contained the actual artefacts, which provided her with the experience of immersion by being *in* the experience and not distanced from it by a narrative or guide. However, the influence of the headset on the experience of atmosphere was also apparent in another way:

It was very quiet – there was no echo and such. It was soundproof. *(Faye, 18)*

That the exhibition was quiet seems like a paradoxical statement, given the constant presence of static noise in the headsets if not within a sound spot. However, it makes sense if we consider the artificial acoustic environment provided by *Exaudimus*, which excluded the aural architecture of the gallery space and offered no replacement in the form of a spatialised virtual sound field. The exclusion of aural architecture might cause unease or disorientation in some visitors, but this was not reported in the interviews.

The informants were asked to describe their experiences in the listening exhibition with three words. Figure 2 shows a thematically grouped aggregate of the different descriptors provided; redundant descriptors have been eliminated.

Prominent among the descriptors are terms considering the different and novel nature of the listening exhibition (Column D). This novelty resulted in confusion for some visitors (Column C), but for most it was a positive experience (Column G), and even resulted in reflection (Column B). We knew that a listening exhibition would be unusual, and we deliberately tried to design a novel way of experiencing radio sound in an exhibition context. So, we expected the visitors to be surprised and perhaps have trouble engaging with the exhibition.

It is different. You shall listen, and not just look. *(Heidi, 15)*

It is the sound that is the primary. It is often something visual. *(Inga, 25)*

It was a bit more fun to listen to something, than just looking at pictures. *(Faye, 18)*

It was like entering a gallery, but every picture that you looked at was a sound clip! And I have not experienced that before! *(David, 41)*

A	B	C	D	E	F	G
Intimate	Interesting	Confusing	Curious	Nostalgic	Humour	Good Experience
Private	Instructive		Surprising	DK history	Fun	Positive
Including	Reflection		Renewed	Everyday-ness	Exciting	It made me happy
			Different	Sound Collage		Relaxing
			Why?	Picturesque		Comfortable
			Listened differently			Cosy

2 Thematically grouped experience descriptors

Roppola uses Ervin Goffman's concept of framing for the preconceptions and expectations based on visitors' previous experiences, which tell them what a museum and an exhibition is (Roppola 2012: 76). From the above statements, it is clear that visitors frame exhibitions as visual experiences. Therefore, a listening exhibition with audio artefacts instead of physical objects constitutes a *reframing* of the visitors conception of what an exhibition can be (see Roppola 2012: 93). This reframing operates through both media and content. *Exaudimus* provided a novel and interactive way of engaging with sound in exhibitions. The audio artefacts, the primary content of the exhibition, extended the visitors' framing of museum artefacts by their audio nature, and by being recent segments of mundane flow radio rather than highlights of radio moments. Thus, the visitor's frame is also challenged by the mundane and contemporary, as they expect museum artefacts to be unique and old. Reframing can be a pleasant and even fun experience, as expressed above by Faye. However, reframing can also result in confusion or disappointment. *Exaudimus* caused confusion in visitors who did not understand the embodied tuning metaphor underlying the system and related static with a technical error. Other visitors abided by the cultural constraint against touching objects in a museum and therefore had an impaired listening experience because, for instance, they were expected to lay on the bed to enter the sonic niche (see Mortensen & Vestergaard 2013: 32).

The mundaneness of the audio artefacts did elicit disappointment in some visitors:

I think that I lacked a certain *wow!* That I would hear something that got me somewhere else—I find that the clips were not good enough, there was nothing special to them that made them super exciting or caught my attention other than the one with Robbie Williams [Because she had heard it before. Emphasis in interview.]. *(Lisa, 50)*

Extending the visitors conceptions through reframing runs the risk of *over*extension, thereby alienating the visitor (see Roppola 2012: 78). It could be argued that by adopting the conventional exhibition form of displaying audio as artefacts and supplying them with labels, we impose a set of visual metaphors on the audio material, disregarding its sonic nature and thereby misrepresenting it (see Dyson 2009: 138). However, by retaining and utilising some of the visual conventions of the exhibition‹ as form, we might have enabled reframing and extended the visitors› conceptions of museum artefacts, as expressed above by David, without resulting in an overextension in which the listening exhibition becomes incomprehensible to the visitor. Still, Heidi found difficulty with this reframing of the exhibition experience:

It was not as I had expected […] it was a little confusing with all the sound in there. *(Heidi, 15)*

Several visitors found the exhibition humorous and fun (Column F). This was also evident in the observations, in which the most common non-verbal affective response to the audio artefacts was laughter (24 instances). All the audio artefacts except one elicited some measure of laughter. This

artefact was a segment of live reportage from a sabotage bombing during the German occupation of Denmark during World War II. You can hear the sounds of gunfire and the detonation of explosives in the background while an eyewitness narrator gives a sober account of the events. Several informants commented on the emotional effect of this artefact:

> You went through many emotions, it was like a roller coaster ride, especially the World War II clip, was kind of sad, when you think the other things have been happier, lighter, then it was more serious. *(Gudrun, 22)*

The emotional roller coaster ride experienced by Gudrun attests to the continual acoustical remooding of the listener's environment enabled by personal music devices such as a headset system like *Exaudimus* (see Rogers 2013: 86). For another visitor, the overall emotion was happiness, again in contrast to the emotion triggered by the sabotage artefact:

> Happiness—and yes, there were also other emotions, when we were sitting on the bed, it was cosy, nice music and a good mood—and then there was where you were back in 1945, it was dramatic – and serious. *(Erica, 41)*

As mentioned by Erica, music is a powerful mood cue. Several informants reported that they enjoyed the music present in a number of the audio artefacts. The music triggered certain non-verbal affective responses in many visitors, especially those related to music, such as dancing, foot tapping, closing eyes and singing along.

We intended the audio artefacts to be the primary factor instigating changes in the visitor's experience. This could be a change in the emotions felt, but it was also enough for some visitors to feel immersed in different ›worlds' reminiscent of the characterisation of immersive experience by Murray, cited above:

> It is a fun way in which you can move around—and suddenly you are in another world. *(Karl, 26)*

While the statements of Gudrun, Erica and Karl testify to the changes they experienced in the atmosphere and emotions affected by the different audio artefacts, Lisa could not detect any changes:

> It was as if the mindset was the same no matter where you moved, because there was nothing […] The universe didn't really change! *(Lisa, 50)*

Lisa clearly needs more to enable her to feel immersed in each listening situation. She calls for further immersive elements and suggests more active use of the lighting, incorporating it as part of the listening situations and adding realistic soundscapes (e.g. using a floor lamp in the living room situation and adding a living room soundscape with children playing in the background or the clatter of coffee cups). This suggests that realism is important for some visitors to experience immersion. Studies have shown that the addition of naturalistic sounds to natural history exhibits increased the impact of the exhibits (see Bitgood 2011a: 182). We could have heightened the realism of some of the listening situations by adding another layer to the augmented sounds (e.g. the addition of a traffic soundscape to the driving and biking situations), thereby strengthening the feeling of immersion. We decided against it because we wanted the audio artefacts to appear as they were without interference.

Apart from the statements above, which clearly state that the visitors felt immersed in the experience, immersion is a complex feeling which can be difficult to put into words. Just one descriptor in Figure 2 is remotely immersive, namely, ‹inclusive›. We did not ask informants directly if they felt immersed in the exhibition, as we did not want to put the word in their mouth. However, different aspects of the exhibition prompted the informants to describe their experience in immersive terms. Now, I will turn to other means of scaffolding immersion. The most common aspect is the physicality of the props:

> I find the props give a different experience […] you identify more with it […] *(Heidi, 15)*

It could also be one specific prop that triggered the immersive experience:

> It was exciting because you stood before the old radio set by the clip from World War II – the purpose was to inform the people back in Denmark from England. That there was this old radio set, gave me really, yes, it gave me the experience of how it must have been to listen to it. *(David, 41)*

Nobody looks at their radio sets while listening anymore. But standing in front of an old radio set, looking at it while listening to the illegal BBC clip from World War II, made David realise how it must have been when the radio, not the television, was the centre of attention in the living room.

Generally, the visitors found the props important. All informants except one said the props contributed to the exhibition in a positive way. (The final informant was indifferent. He described himself as a ‹voice fan› and would qualify as an expert listener able to appreciate the audio artefacts by themselves outside of an exhibition context.) It appears as though the physicality of props is an important sort of scaffolding for non-expert visitors to enjoy and be immersed in the listening exhibition.

The next element of the listening situations intended to create immersion was the performance aspect. Observations show that half the visitors performed all or most of the activities. Only five did not engage in any activity.

It was just perfect! It was put together really well. It was nice that you should bike for a bit, get some exercise. *(Erica, 41)*

I did not find it silly or superfluous. Because, as I said, I listened differently according to what I was doing in that way. This was an experience for me! *(Lisa, 50)*

It appears as though the activity element does add to the immersive experience for some visitors, and most see it as a nice option. However, it is not a part of the scaffolding as important as the props.

The final element of the listening situations was the text labels. Almost all the visitors read all or most of the labels, and most did so before engaging with the audio artefacts. No respondents reported that the mental imagining techniques used on the text labels aided their experience of immersion. However, the labels triggered similar memories for Gudrun:

The bed, where you are laying, hangover, the text, you need something to do, but you cannot be bothered [laughing] It can be all good or it can be all sad… *(Gudrun, 22)*

The text does not mention hangovers, so this experience is supplied from memory. Memories could also be triggered by the audio artefacts themselves. Augoyard and Torgue term the sonic triggering of memories *anamnesis*: «[a]n effect of reminiscence in which the past situation or atmosphere is brought back to the listener's consciousness, provoked by a particular signal or sonic context» (2006: 21). Several of the informants reported experiencing anamnesis:

It brought back memories from primary school by the last post with the show from World War II. It reminded me of something I had heard in class at one time. And the one with the ladder and journeyman theme reminded me of when I worked in a factory […] I listened to a lot of radio back then. *(Benjamin, 21)*

In this case, the memories are triggered not by the specific semantic content, as it is unlikely that Benjamin has heard these segments before, but by the tone and atmosphere of the audio artefacts, which remind him of previous experiences with radio that had similar atmospheres.

In several cases, the memories were accompanied by feelings of nostalgia:

You get a strong dose of nostalgia that awakens other personal and intimate feelings—for example with the Electrical Barometer to which I can relate. *(Alexander, 27)*

While there were no reports of the imaginative wording on the labels playing a significant role in guiding the listening experience, there were also no reports of the wording being inappropriate or incommensurate with the visitor's own atmospheric experience of the audio artefacts. However, Lisa felt that this form of gesturing was superfluous:

I didn't really understand—I mean, hearing what I was reading? It was a bit like telling what a song is about before singing it. *(Lisa, 50)*

Even if the different elements of the exhibition design are deemed more or less important by the visitors, each contributes to the visitors‹ experiences by scaffolding the atmospheric and immersive qualities of the listening experience. In an analogue fashion, this corresponds with Chion's concept of *added value* in the relation between image and sound in film: «Added value works reciprocally. Sound shows us the image differently than what the image shows alone, and the image likewise makes us hear sound differently than if the sound were ringing out in the dark» (1994: 21). This reciprocity, where the sound influences the perception of other objects (props), was also apparent in the exhibition and in David's perception of the old radio set mentioned above. In this exhibition, the relation between the props and the audio artefacts was quite literal, but one can imagine other listening exhibitions in which the relation between the audio artefacts and the other objects in the exhibition is more creative or symbolic.

Conclusion

In this article, I have examined the transformation of an exhibition space into an auditorium as a listening exhibition. In particular the study focused on the atmospheric and immersive aspects of the listening experiences afforded by the exhibition environment. Firstly, there was considerable agreement among the informants about the character of the dark atmosphere in the exhibition. It was perceived as intimate/private and cosy/nice. According to the Mood-Cue Approach, a positive mood shows a disposition for experiencing further positive emotions, and many informants used positive descriptors for their overall experience. Roppola further suggests that a positive atmosphere is conducive for engaging with the exhibition content. The observations showed a relatively high level of engagement from the visitors. Nearly all the visitors listened to all audio artefacts, most read the labels and only five did not partake in any performance.

Secondly, the atmosphere made several informants feel «present» and «part of» or «in» the experience. I view these experiences as different expressions of immersion in a figurative sense. Informants also reported how different audio artefacts elicited different emotional responses and transposed them into different ‹worlds›. It was shown how aspects of the exhibition design such as props and performance served as scaffolding for these immersive experiences. They aided the visitor to «identify» more with it or «gave the experience of how it must have been». This speaks to the benefit of displaying audio artefacts in an exhibition rather than accessing them via a listening kiosk.

Thirdly, I have argued for the relevance of the phenomenological concept of audio artefacts as being constituted in situ when a visitor is listening. This became apparent, as the personal emotional responses of the visitors constitute an important part of the listening experience and thus the meaning making of the artefact. This was evident in the triggering of anamnesis and nostalgia in some visitors.

Sound is often used as an interpretative device or atmospheric soundscape in exhibitions. By foregrounding audio and sound as artefacts in the exhibition environment, attention is brought to this neglected form of intangible heritage. Radio forms a significant part of our media heritage, not only as an information resource for the past hundred years but also as the soundtrack that has accompanied many of our daily endeavours. This was the theme of the listening exhibition, and the aim was to bring this background radio sound to attention and focus on its auditive qualities. Subverting the visual conventions of the exhibition in this way might challenge the assumptions and preconceptions of the visitors. This could lead to confusion for the visitors, but often this reframing was a pleasant surprise that enhanced their museum experiences. It seems that by retaining some conventions of exhibition design, such as the labelled artefact, the visitors was able to use their previously acquired ‹museum literacy› to navigate and appropriate the novel environment of the listening exhibition.

Further explorations foregrounding sound in exhibitions are needed, as are in-depth studies on how visitors experience listening in exhibition environments. Maybe in time we will overcome the visual bias of the exhibition space, and the auditive will become second nature for curators and exhibition designers as well as visitors.

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