

Article

COVID-19 Impacts on Historic Soundscape Perception and Site Usage

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Abstract: The ISO 12913 standards acknowledge the primacy of context in perceiving acoustic environments. In soundscape assessments, context is constituted by both physical surroundings and psychological, social, and cultural factors. Previous studies have revealed similarities in people's soundscape assessments in comparable physical surroundings, such as urban or national parks, despite differing individual associative contexts. However, these assessments were found to be capable of shifting in the historic setting of the Berlin Wall Memorial. Providing contextual information from the past appears to have some bearing on soundscape perception. The COVID-19 lockdown measures enacted since March 2020 in Germany have prevented most tourist activity at the memorial, and a resulting shift in user activity has been observed in the otherwise open and accessible memorial landscape. Building on previous soundscape investigations conducted at the memorial, this paper investigates what effect the restrictions have had on the soundscape context and its perception by visitors. Informal interviews paired with comparative measurements indicated context pliability for local stakeholders. In contrast to site programming alone, tourist presence also appears to affect context perception for local users. This holds repercussions for soundscape and heritage site designs serving local and tourist populations—and their divergent perceptions—alike. The impacts of soundscape assessments being neither static nor generalizable across stakeholders are discussed with suggestions for further research.

Keywords: historic soundscape; soundwalk; interview; historic monument; memorial stakeholders; urban memorial



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1. Introduction

Despite the central role that context plays in soundscape perception, its components and influence attract far less research attention than perception descriptions. However, it is essential to identify how complex the dynamics are between context and perception, and how these can shift over decades or over a very brief period. The COVID-19 pandemic enacted societal-level shifts in shared surroundings and behavior, which profoundly impacted environments [1] and city soundscapes across the world. Researchers have taken note and begun to study these shifts during lockdown measures, focusing on the domestic sphere [2], city neighborhoods [3], and selected locations representing cross-sections of urban public spaces [4]. Several of these studies demonstrated a change in noise levels due to reduced mobility and lockdown measures but also observed a change in people's behavior that likely contributed to the soundscapes. However, the effect of COVID-19 on the soundscape of historic landmarks and memorials, and their multiple stakeholders, has so far received limited attention.

The Berlin Wall Memorial and its historic soundscape were previously studied to determine the perceptual contribution on visitor's engagement with the site and its historic

context [5]. The participants in that study were identified as coming from three general groups: tourists/visitors, memorials staff members, and local residents/living witnesses to the Berlin Wall. The majority of participants were not residents or living witnesses.

Outdoor accessibility to the memorial remained unchanged during lockdown measures related to controlling the spread of COVID-19 in Berlin. Thus, it was possible to study the memorial in the early spring of 2021 to observe new usage patterns, visitor mixes, and changes to the soundscape composition during lockdown measures. Given travel restrictions from outside the country, limits on informal group gatherings, and prohibitions against organized tours and class trips, study during lockdown provided an opportunity to study the behaviors and perceptions of predominantly local users without the influence of outside tourists.

Qualitative data collection methods, mostly unstructured interviews, were employed to better understand the nuanced perceptions of stakeholders. Such qualitative data collection methods are becoming increasingly significant tools in soundscape research elsewhere [6,7] and were found to be appropriate tools in this case as well. Sound level measurements were also made to compare pre- and mid-pandemic conditions and served to support the findings from participant interviews. In contrast to the descriptive scalar surveys used in the initial study [5], qualitative interview methods allowed the collection of participant impressions informed by a year of personal experience rather than one research day, in keeping with similar work in soundscape and planning applications [6,8,9].

This publication builds on a series that has investigated soundscape perception in the historic environment of the Berlin Wall Memorial [5,10–12]. This previous work affirmed how perception related to context could shift based on immediate experience (visiting a condition twice during the study) and the introduction of historic information relating to the place. It was observed that perceptions of the same conditions could shift, or the terms used to describe them could be applied differently once historic information was known—soundscape perception was shown to be somewhat mutable when visitors were supplied with historic context. It also became clear that soundscape inherently plays an active role in the pedagogical ends of the memorial [5]. Additional research in 2021 investigated whether these observations would be applicable during a significant change in user profiles and societal norms brought about by the COVID-19 pandemic.

2. The Historic and Physical Context of the Memorial

The Berlin Wall Memorial is a managed urban landscape stretching over 1.2 km along the east side of Bernauer Strasse in central Berlin. Historically, this land held a section of the Berlin Wall that was the subject of significant local protest, media exposure, and escape attempts. Today, the manicured grasslands hold one of the largest intact stretches of the original Wall along with archaeological remains of the pre-Wall-construction neighborhood, interpretive stations with historic information, a reconstructed portion of the Wall and death strip (Todesstreifen), and an exhibition space and visitor center (for details on the history and current context of the memorial, see [5]). The Berlin Wall Foundation, which oversees the memorial, states its mission as documenting and providing information about the history of the Berlin Wall to the public as well as preserving historical sites and authentic remains related to the Wall [13], and it is to this end that the entire landscape and a few attendant structures are dedicated.

There are numerous designed components for viewing and interacting with the Wall's history, and pathways through the grass designate lines of travel: navigating the memorial landscape is thus a structured experience, even though it presents an open grass-scape. Certain activities and behaviors are implied as expected within the territory through its design, such as guided sightseeing, tracing the original patrol road and other pathways, listening to pre-recorded historic material, observing and sometimes touching building remains, and picture-taking. Groups of people are expected, as the territory provides ample space and accessibility around interpretive stations. Group dynamics are also semi-defined: activities associated with a park setting (rather than a memorial) are discouraged, such

as picnicking, playing games, flying kites, exercising dogs, or playing music. Similar expectations are observable at most commemorative historic sites.

The soundscape of the memorial is influenced by visitors and their activities, but the sonic environment is not uniform; a monumental core is kept purposefully silent, there is a noticeable difference between zones on the west versus the east, and discrete sonic practices (such as the daily ringing of salvaged church bells) punctuate the soundscape. The previous study of the soundscape at the memorial consisted of two main efforts: archival research and an in-person study conducted with participant surveys (described in Section 3). Research sought to bring together all mentions or insinuations of the sonic environment throughout the Berlin Wall's entire active history along Bernauer Strasse, from 1961–1989 (for a detailed summary, see [12]). An existing collection of living witness accounts collected by Berlin Wall Memorial staff formed an essential foundation of first-hand historic sonic impressions, with individuals recounting their observations as residents living on the east and west sides, or as military personnel working within the Wall's inaccessible deathstrip territory. Photo archives, period news coverage, texts, and GDR military documents were consulted as well. Together, representative stories emerged that illustrated the sonic environment, and defining sonic features could be identified for certain periods of the Wall's history along Bernauer Strasse. For instance, residents on the east recounted a pervasive, menacing silence in the 1970s; residents on the west remembered the intensity of protests, tourists, and gunshots from 1961–1962, while GDR guards kept meticulous logs of sonic 'disturbances' from either side but might also be listening to clandestine radios. This information was used to distill the historic information provided throughout the soundwalk study.

3. Previous Studies

3.1. *The Objective and Design of Previous Berlin Wall Memorial Soundscape Study*

Soundwalks are a common and popular method tool for investigating soundscapes using various data collection approaches [14]. Soundwalking is an empirical method for identifying a soundscape and components of a soundscape in various locations [15]. It has also been used productively in the study of historic soundscapes [16,17]. Usually, acoustic and judgmental data is collected in situ by visiting predefined sites with a small group of participants and, after listening a few minutes to the acoustic environment, multiple ratings are requested. Recently, researchers have been applying a variety of instructions when composing a soundwalk [18]. For example, the level of attention directed towards individual sounds can vary; while some researchers refer only to the assessment of sounds, other researchers highlight the multi-modality of soundscape experiences, emphasizing the relevance of visual sensations or even pointing out other sensory factors like thermal aspects [19]. Correspondingly, the ISO/TS 12913-2 [20] offers varying instructions for alternative soundwalk data collection methods: the instructions range from "closing your eyes (when safe to do so) can help to improve listening" to "use all of [your] senses to perceive the respective surroundings." Unfortunately, the implications of using different instructions are neither addressed in the technical specification nor systematically in scientific publications so far.

One of the goals of the original Berlin Wall Memorial soundwalk was to investigate the relevance of instruction in soundscape investigations, which enforces a certain context and frame of reference for the participants. To do so, instructions were adjusted halfway through the soundwalk and previous soundwalk positions were then revisited; the effect of the modified instructions on soundscape assessments was subsequently studied by comparing responses given with original and modified instructions.

To consider the breadth of human feelings and emotions elicited by acoustic environments, different emotional dimensions [21] are usually considered. These follow current trends in soundscape research, as the affective quality of acoustic environments has gained significance in studies [22]. Axelsson et al. derived a multi-dimensional model of perceived affective quality in the context of soundscape, which consists of the orthogonal dimensions

pleasantness, eventfulness, and familiarity [23]; the same dimensions were also adopted by the international technical specification ISO/TS 12913-2 in defining multiple rating scales used in determining the affective quality of acoustic environments [20]. However, there is an ongoing debate about what are relevant dimensions for study, with alternate proposals such as *appreciation, coherence, or familiarity* ([24,25]). Additionally, dimensional attributes are not calibrated for settings with a memorial function. Therefore, the questionnaire employed in the Berlin Wall Memorial study was partly modified and a different set of attributes were added to understand which were relevant and whether additional alternate proposals were needed (see Table 1).

Table 1. Adjective pairs and categories targeted by each.

Category	Adjective Pair	
Condition assessment	Constant	Changing
	Natural	Artificial
	Dense	Sparse
	Old	New
Intellectual appraisal	Appropriate	Inappropriate
	Meaningful	Meaningless
	Significant	Insignificant
	Authentic	Altered
Emotional response	Comfortable	Uncomfortable
	Acceptable	Unacceptable
	Pleasant	Unpleasant
	Natural	Artificial

It is essential to recognize that the primary motivation in visiting a memorial or heritage site may not be similar to that for an urban park, shopping center, or residential area [11,26]; thus, a semantic differential needs to cover a wide potential range of responses and assessments. A programmed heritage environment (one that actively communicates its histories to visitors) is unique; common and established dimensions related to affective qualities may be insufficient when applied in heritage environments. In order to study affective qualities within memorial heritage contexts in particular, the study at the Berlin Wall Memorial employed a modified questionnaire consisting of twelve bipolar attribute pairs, chosen from a wide range of existing studies [27] covering three major categories as indicated in Table 1. To increase the understandability of the dimensions to be judged, bipolar scales were used instead of the unipolar rating scale design proposed in ISO/TS 12913-2 since, according to Bortz and Döring, bipolar scales tend to be more precise [28].

The attribute pairs were grouped into general categories as a convenient way to distinguish types of assessment. Condition assessment, a term familiar in physical heritage conservation, here denotes the identification of a soundscape's 'objective' characteristics; intellectual appraisal pairs assert a rational, reflective judgement of conditions; and emotional response pairs indicate the felt, spontaneous result on the individual. Many of the pairs have direct and intentional connections to heritage discourse, such as *significant-insignificant, meaningful-meaningless, appropriate-inappropriate, old-new, and authentic-altered* (see, for instance [29–32]). Attribute pairs that were used primarily to describe preference through enjoyment or enlivening surroundings were limited to *pleasant-unpleasant, acceptable-unacceptable* and *comfortable-uncomfortable*, which also cover the commonly used *valence* dimension [21]. Further pairs of attributes focused on the *arousal* [21] and *eventfulness* dimensions as it is frequently named in the context of soundscape [22]. The soundwalks allowed the importance of the context provided through instruction to be systematically investigated and the meaning of intellectual appraisal-related attributes to be explored.

3.2. Procedure and Methods

Because the study was primarily seeking insights into the effect of (historic) context on participant perception, the instructions were broken into two parts. A first set of instructions

preceded the soundwalk that focused on the general procedures of the work: how to listen to the soundscape, how to note one's impressions using the survey sheets provided, and how to record other information. Most importantly, participants were alerted that the leader of the soundwalk would answer any questions related to these procedures but would not answer questions having to do with the site itself or how one should interpret the intended meanings of terms on the survey sheets. The participants were requested to provide their ratings on 5-point analogue, bipolar rating scales. Table 1 indicates the attributes used as bipolar verbal labels at the extremes of the scales. Participants were asked to mark anywhere along the scale to indicate their responses. The scales were arranged in random order on each successive sheet of the questionnaire. Participants were told to interpret attribute terms in the way that made the most sense to them and not to discuss this information between participants. The focus of instructions at this stage was to enable participants to conduct an informative soundwalk based on immediate and unadulterated impressions.

The second set of instructions were conveyed to participants halfway through the walk. Participants were asked to maintain the same listening and notation procedures as before but were additionally provided with historic information related to each study position by the soundwalk leader. The leader from that point on offered to answer any questions related to the site and its history, while participants were still asked to interpret the meaning of terms on the survey sheets for themselves. In total, twenty-seven individuals (19 female, 6 male, 2 other) participated in the study, recruited by ad hoc sampling and calls for participation through the Berlin Wall Memorial. Four soundwalks were conducted in total [11].

Besides the collection of ratings, acoustic measurements were taken with a calibrated and equalized binaural headset (SQobold, BHS II) at each site for at least three minutes. As Figure 1 shows, the absolute mean level difference between the locations visited in the first part of the soundwalk and the revisited locations after receiving historic information was less than 2 dB with a median value of only 1 dB. The absolute mean loudness difference amounts for less than 10%. The differences of the L_{Aeq} and the loudness values N_5 between the first and second visit were not statistically significant ($p > 0.05$). This indicates that the acoustical conditions present at the soundwalk sites were similar during the first and second visits.

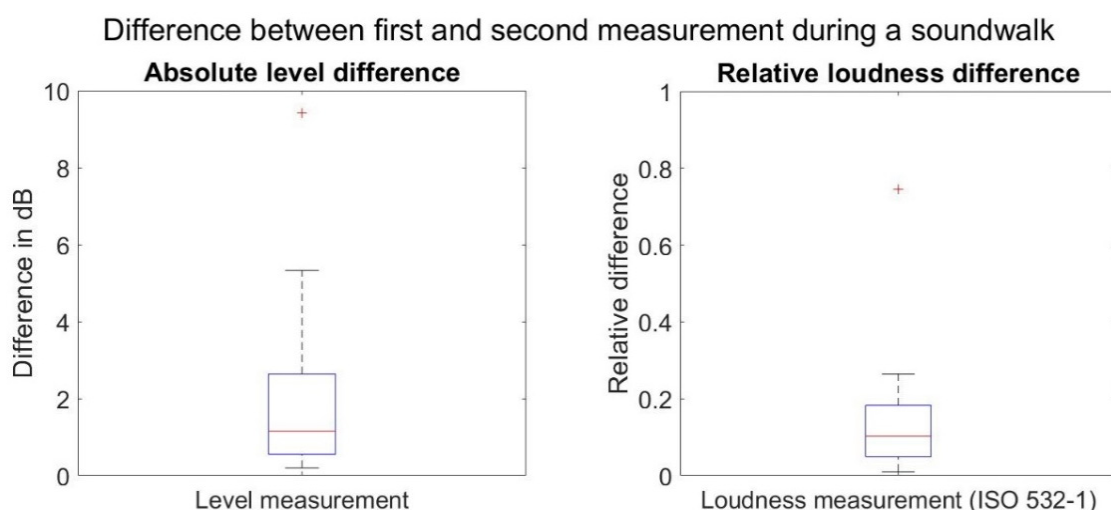


Figure 1. Boxplots displaying the level and loudness differences between the first and second visit of the same location during a soundwalk. Left: Sound pressure level differences in dB; right: Relative loudness differences in % according to ISO 532-1 [33]. The box displays the spread of data. The lower and upper box boundaries represent the 25th and 75th percentiles (interquartile range IQR), the whiskers represent the range of the remaining data up to a length of $1.5 \times \text{IQR}$, data falling outside the whiskers are marked as outlier values with a “+”.

3.3. Summary of Previous Results and Findings—Changes in Context

As the participants visited four positions twice during the soundwalk, it is of interest whether significant changes occurred between visits due to the addition of historic context information. A two-way analysis of variance was employed to compare the influence of instructions with historical information and the influence of different positions on the multiple rating scale responses. As expected, the result of the two-way ANOVA indicates that the factor location has a statistically significant effect on the ratings of multiple category scales for all attribute pairs except *authentic-altered* [11]. The insignificant differences between the ratings for *authenticity* are likely due to all positions being visibly part of the Berlin Wall Memorial, thus each position is perceived to actively represent the site's history.

Only a few rating scales demonstrated statistically significant effects related to the instructions given during the soundwalk [11]: the items *insignificant-significant* and *meaningless-meaningful* were statistically significantly affected by the historic content provided to participants. The ratings related to *significance* and *meaning* differed between the first and second visits at all soundwalk locations in a statistically significant way. Although the observed effect sizes are small, the study positions were rated as more *significant* and more *meaningful* during the second visit after receiving additional historic information about the specific place. In some cases, statistically significant interaction effects occur, and the effect of the historically-related instructions on the soundscape ratings do not systematically influence the ratings on comfort and nature; rather, the resulting effect depends on the specific site and the respective historical information provided.

In order to detect underlying latent dimensions of the multiple rating scale assessments, the questionnaire data was analyzed via a principal component analysis that is widely used in analyzing semantic differential rating scales ([34]). Based on the assessment data, the first three components extracted have eigenvalues larger than 1. The first three principal components together explain 56.1% of the total variance. The first component, explaining 32.0% of the total variance, is highly correlated with the attributes *pleasant*, *natural*, *comfortable*, *acceptable*, and *appropriate* as shown in Table 2. The second component, explaining 14.2% of the total variance, shows high correlations with *significant* and *meaningful*. The third principal component, explaining 10.0% of the total variance, has high correlations with the attribute *changing*.

Table 2. Principal components related loadings of the semantic scales.

	Component 1	Component 2	Component 3
Changing	−0.102	0.183	0.790
Natural	0.736	−0.053	−0.149
Authentic	0.538	0.153	−0.425
Old	0.359	0.540	−0.271
Appropriate	0.609	−0.089	−0.016
Significant	0.299	0.781	0.133
Comfortable	0.689	−0.421	−0.030
Sparse	0.444	−0.283	0.395
Acceptable	0.675	−0.222	0.264
Pleasant	0.767	−0.241	0.065
Meaningful	0.590	0.610	0.208
Clear	0.584	−0.011	−0.031

Data analysis shows that in situ ratings are systematically affected by the introduction of information related to the history of the visited place and to the former soundscape, despite the fact that the acoustical character of the places in terms of sound pressure level or loudness did not differ significantly (see Figure 1). The contextual information upon second visits during the soundwalk, the assessments related to the bipolar category scales *insignificant-significant* and *meaningless-meaningful* changed considerably. Table 2 underlines the importance of the *meaning/significance* dimension in the context of the collected soundwalk data further. Both scales correlate highly with the second principal component. These observations underscore the potential of these terms despite their being newly introduced terms in soundwalks; they received consistently high response rates, indicating their understandability and usefulness [5].

As the sample consists of different stakeholder groups, the collected data were also subject to cluster analyses. It turned out that little difference was found between the in-situ assessments of different user groups (i.e., tourist, residents, and staff members of the memorial). As mentioned earlier, the majority of participants in the original study were tourists and memorial staff members. As will be discussed in the next section, it took the extraordinary circumstances of prohibited tourism to thoroughly study the perception of nearby residents, though not in typical conditions.

4. New Contextual Observations in 2021

New observations made at the memorial in spring of 2021 come from informal conversations with seven visitors to the memorial grounds, hour-long informal interviews with two memorial staff-members who are also local residents, and four sets of sound level measurements conducted at the five original study points (see [5]). Combining these information sources, it was possible to compare both conditions and visitor behavior across a dramatic shift in context introduced by the pandemic.

For this discussion, the designation of “visitor” applies to any stakeholder who is present on the memorial grounds. The designation of “tourists” or touristic activities distinguishes the motivation behind a visit as being explicitly for learning about the history of the memorial, whereas a “local resident” is distinguished by their living in general proximity to the site. Naturally, resident and tourist categories can occasionally overlap, though the following observations found overlaps to be rare.

4.1. How the Memorial Visitors Changed during COVID-19 Related Lockdown Measures

The most evident contextual shift at the memorial has been the number and type of visitors to the landscape. The year 2019 saw a record 1,219,000 people visit the memorial [35]. During peak season, 6–8 tour groups an hour—thousands of people a day—would traverse the landscape. Director of the memorial Dr. Axel Klausmeier saw this number vastly decrease throughout 2020 and into 2021, as organized tours and travel generally were rendered impossible [36]. In the first few months of the pandemic (March–June 2020), almost no one was observed in the grounds, as was true throughout the city at large—memorial staff member Julia Reuschenbach described the memorial as relatively silent [37]. As measures eased in the summer but travel restrictions and group functions remained almost entirely curtailed, small numbers of people could again be spotted. Visitors appeared to be Berlin residents from the immediate neighborhood looking for a space to relax outside of their apartments (many apartments in the immediate area have limited access to personal green spaces). Depending on the severity of lockdown measures in place, these visitors could be seen playing with dogs, picnicking, reading, playing sports (such as squash against the central monument wall), participating in group exercise such as boxing, holding birthday parties, and other recreational activities [36,37]. Overall, the behavior aligned with what would be expected at the nearby Humbolthain, Nordbahnhof, and Berlin Wall Parks rather than the memorial. Reuschenbach observed that overall numbers of observed visitors have remained low compared with pre-pandemic numbers,

and the concentration of those that did visit has visibly ebbed and flowed depending on the lockdown restrictions since the summer of 2020.

Before the pandemic, the public was most likely to encounter memorial staff only in the form of official tour guides leading groups throughout the grounds [36,37]. While they were a constant presence, Klausmeier emphasized the symbolic importance of ensuring no guard or monitoring patrols were reintroduced in any form. With tours forbidden due to health concerns, the “official” or visible presence of the memorial has been essentially eliminated during the pandemic in both sight and sound. Staff members on lunch break or those who live nearby might walk through the memorial, and, on these occasions, they take the opportunity when necessary to remind visitors of the memorial’s role as a place of remembrance rather than recreation or ease. During these interactions, Klausmeier recognized in visitors’ behavior an implicit understanding that the site is not a park or a garden and that there is a “special difference” that attracted them, causing them to cluster near certain memorial features. However, while these individuals gathered near displays of victims’ names or the remains of demolished homes, their activities (e.g., recreation, picnicking) did not demonstrate an engagement with the gravity of their surroundings. Similarly, Reuschenbach found in her conversations that residents were motivated to visit the “green space” without recognizing that the memorial—and what might be called its behavioral atmosphere—extends beyond the monumental core into the grassy spaces (as seen in Figure 2). Visitors were simply enjoying, perhaps for the first time, the open lawn in their neighborhood. Informal interviews with visitors in situ confirmed similar behaviors by residents who described feeling they had more space and opportunity to enjoy and interact with the memorial. Figure 2 demonstrates the new patterns of inhabitation in the memorial grounds, which are largely the reverse of pre-pandemic patterns: tourists largely stayed on the pathways and paved surfaces, abiding by structured expectations of interaction, whereas the local residents during the pandemic can be seen spread out in the grass and sitting with their backs to historic material.

Overall, it can be said that residents visited the memorial during the pandemic when allowed, though not anywhere near the numbers reached by tourists in previous years. These residents were only occasionally observed to interact with the historic material of the memorial; more often, they engaged in activities fitting an urban park.



Figure 2. Images taken of the Berlin Wall Memorial in 2017 and 2021. (a) The Berlin Wall Memorial on the west side of the memorial core along Bernauer Strasse during pre-pandemic (**left**) and mid-pandemic (**right**) observations (**Left** image Pamela Jordan; **right** image André Fiebig); (b) The Berlin Wall Memorial in the southern death strip interpretive territory of pre-pandemic (**left**) and mid-pandemic (**right**) observations. The historic patrol road is in the center of each image (**Left** image Pamela Jordan; **right** image André Fiebig).

4.2. Other Behavioral Shifts at the Memorial

In addition to the difference in physical space usage, three further points on behavior at the wall are worth noting—first is the importance of claim over the territory. A reaction common to residents in European cities with mass tourism prior to the pandemic has been a sense of rediscovering and reclaiming the city for themselves during mass lockdowns [38–40]. Similar sentiments are at work at the Berlin Wall Memorial. One 2021 visitor interviewed felt able to experience the memorial because the tourists were absent, insinuating that the history for residents feels inaccessible when consumed by tourists. However, more typical were ahistorical motivations in using the “green space”, going so far as to use the monument’s wall for squash games. Many visitors did not appear to seek out nor interact actively with the history on display at all. Klausmeier

notes that 63% of Berliners no longer have lived experience of the division enacted by the Wall, which may explain why such a vital space of remembrance has been treated as a neutral space—unthinkable at its celebrated opening in 1998. The reclaiming of memorial grounds appears in semi-defiance of the respectful remembrance that is typically seen along Bernauer Strasse; however, a common visitor argument against behavioral expectations is deeply rooted in the history of the Berlin Wall. Both Klausmeier and Reuschenbach recounted exchanges where visitors voiced the symbolism of reclaiming the space not from tourists, but from division. The memorial is a no-man's-land now made public, accessible day and night—why not inhabit it? Why is solemn remembrance the only appropriate behavior? Historical claim appears to be invoked in defense of appearing disrespectful, which might mark an important shift in the memorial's city-wide role as a memory vehicle.

The second observation related to behavior is the influence borne by official presence in the landscape. When possible, Berlin Wall Foundation tour guides have participated in stationary “live speaking”, where they stand at specific points throughout the landscape and ask visitors if they have any questions or would like more information. Reuschenbach noted that this seemed to add more historic sensibility to one's visit, even if the exchanges were brief. She also observed that it seemed to act as a deterrent against more obvious recreational behavior nearby. This has been the only obvious official presence observable throughout the memorial. The deterrent effect links to Reuschenbach's observations of behavior pre-COVID-19, when the official tours (in addition to those led by outside travel operators and guides) would bring thousands of tourists through the terrain during high season (typically summer and early fall). The sheer numbers appeared to function as a type of social control simply because there was little room for other activities. However, given Reuschenbach's observations during lockdown, it seems plausible that formal actors and uses of the memorial may influence locals' behaviors fundamentally rather than as a mere matter of logistics.

Lastly, the influence of perceived quiet presents differently during the pandemic as well. Silence has been an important aspect to the memorial—the core monument of the reconstructed deathstrip is kept as a silent zone devoid of visitors. This is a consistent conservation choice, as people were never allowed into the deathstrip during the Wall's history. However, quiet in some form is also a common feature of memorials, a solemn sensory cue of a lethal past, that something or someone is missing and bears remembering. In this regard, quiet has been officially encouraged along Bernauer Strasse as well, both surrounding the monumental core and throughout the territory. Prior to 2020, it was observed numerous times that surrounding quiet would indeed influence individuals or small groups into minimizing their sonic influence in the space. For instance, a small group would enter the back of the memorial core, an unearthed house foundation, or an open area in view of victims' photographs; finding only a few individuals already there, these new visitors would lower their voices and keep their movements contained. This could be considered a form of *situational norm* under informational social influence; following Tjeerd et al.'s description of situational norms as “knowledge-based beliefs about how to behave in particular situations that are shaped by social influence”, here they are informed by informational social influence, where visitors unfamiliar with the site “consult the behavior of those around them to find out what to do” [41]. The social dynamics of this effect are not surprising; what is interesting is that the same effect was not often observed during the pandemic. When people have been permitted outside during the pandemic, Klausmeier and Reuschenbach observed boisterous activities such as birthday parties and group workouts despite the presence of scattered individuals interacting with the memorial's explanatory panels or installations. The *situational norm*, or the social/behavioral expectations invoked by the site, may be vastly different between stakeholder groups.

4.3. Sound Measurements

Measurements of sound pressure levels were taken across two days in spring of 2021 (21 March and 11 April) in order to compare pre- and mid-pandemic sound pressure levels at the memorial. Pre-pandemic soundwalks and measurements were conducted in July, August, and October of 2017. The intent of 2021 work was to establish what shifts the physical sonic environment had undergone that might affect visitor impressions; research was conducted with awareness of possible seasonal variations in noise levels, as has been found elsewhere [42]. A calibrated binaural headset was used and repeated measurements of a least three minutes according to the ISO/TS 12913-2 were performed. These measurements followed the measurement protocol used in 2017 using the same measurement positions.

Figure 3 illustrates that the observed sound pressure levels in terms of the L_{Aeq} , as expected, were lower compared to the pre-COVID time, except for location 2. However, the differences are not large; the sound pressure level decreased on average only around 2 dB(A). The small reduction observed at the memorial is most likely due to a slightly lower input from road traffic noise and the lower number of average total visitors. Such reductions could also be consistent with values found in a typical year, particularly considering differences in activity between early spring (March–April) versus the June–October high season for tourism. Studies conducted prior to pandemic conditions measured slight seasonal shifts in urban noise due to visitor activity [43,44]. Larger reduction effects have been noted due to the pandemic containment measures in 2020 [4]. Thus, small amounts of seasonally based variability cannot be ruled out from the observations made at the memorial. However, recent mobilities studies in Germany have shown that the amount of road traffic in 2021 reached almost the level of pre-COVID time [45], so a comparable amount of background noise at the memorial caused by the road traffic and public tramway—a significant portion of background noise at the site—is expected. This observation is in line with other studies performing repeated soundwalk measurements over longer durations, where stable acoustic conditions were observed for several urban sites over a period of several years [46].

As shown in Figure 1, the measurement results in sound pressure level or loudness between visits 1 and 2 during a soundwalk varied within a certain range as well and indicates some kind of measurement uncertainty. This variation was almost identical to the identified noise reduction during the pandemic, which reinforces the supposition that the minor change in acoustic environment is due to missing tourists. Apart from the small overall noise reduction effect due to the pandemic, the level differences between the locations remained almost the same. The level variability between the memorial sites is very similar to the pre-COVID times. Psychoacoustic analyses could provide additional insights but were not employed in this study.

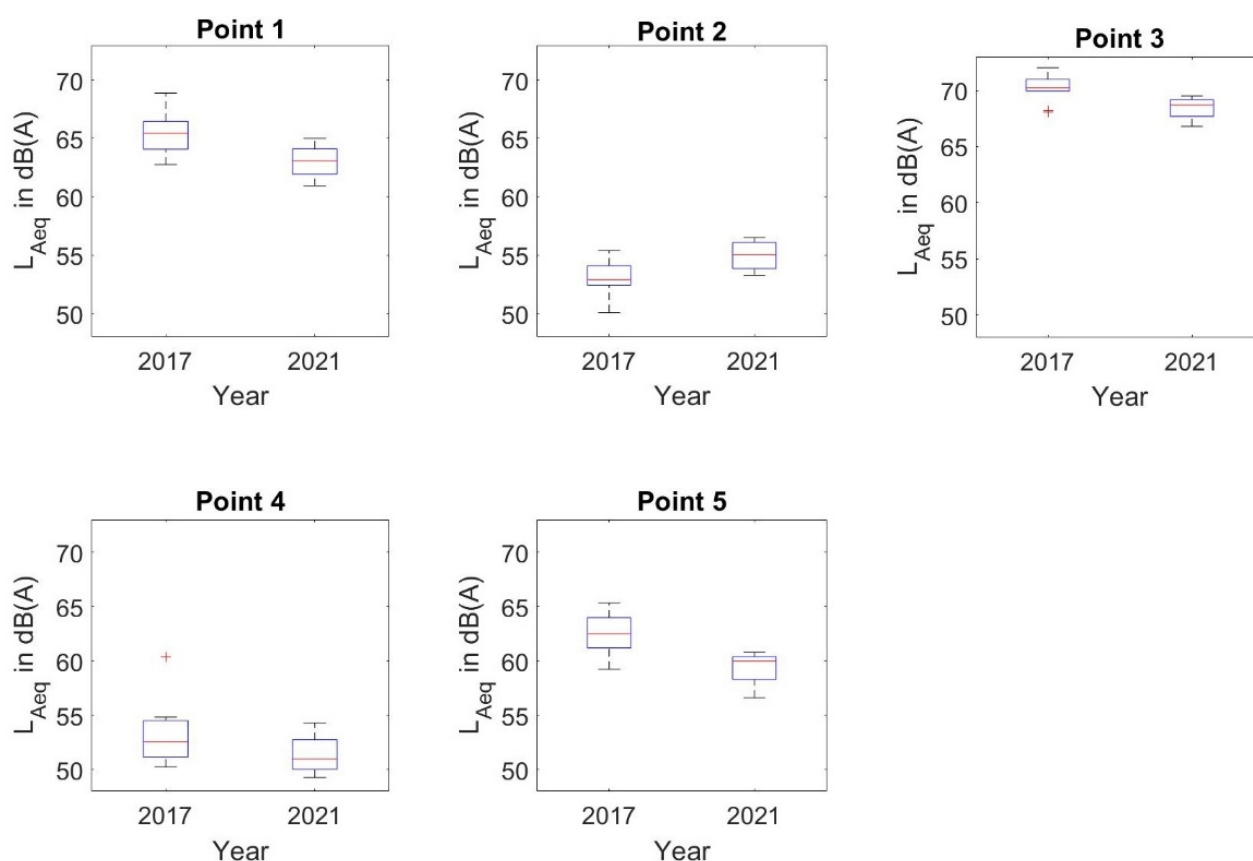


Figure 3. Comparison of sound pressure levels (L_{Aeq}) measured during soundwalks in 2017 and 2021 for all five soundwalk locations (boxplot). The box displays the spread of data. The lower and upper box boundaries represent the 25th and 75th percentiles (interquartile range IQR), the whiskers represent the range of the remaining data up to a length of $1.5 \times IQR$, data falling out-side the whiskers are marked as outlier values with a “+”.

4.4. Summary of Observations

At the Berlin Wall Memorial, there are striking differences mixed with long-term consistencies in the soundscape. The user mix has drastically changed; with tourism on pause, group cycling, and tour bus activity has ceased, foreign languages are heard infrequently, and large group tours do not take place. Locals have replaced some of these sounds with more recreation-oriented activities, but the overall perception of the landscape is one of emptiness and quiet, perhaps rendering out-of-place sounds such as birthday parties all the more striking for observers. It is obvious that the lockdowns modified the present and absent sounds of sonic environment of the memorial, as has been found elsewhere [47]. This stands in contrast to the measured results, which found that the physical sonic conditions of the memorial are within 2–3 dB of non-pandemic conditions—likely not enough of a difference to be the dominant cause of perception shifts. Maybe, perceived differences of the acoustics environment are more related to the sound character than its level or loudness. While the soundscape, at least in terms of background levels, is more or less the same, the perception of it, and the ensuing ways that people have been interacting with it, have changed.

5. Discussion

As mentioned above, the measured levels of the Berlin Wall Memorial soundscape have not significantly changed during the COVID-19 lockdown measures. However, the territory is perceived as much quieter by staff and visitors, and visitor behavior has shifted during this time. This raises important implications for soundscape research, particularly when considering user groups and contextual grounding in studies.

What seems clear is a possible and profound perceptual difference between user groups, even if they all share an appreciation of the history explained and symbolized in the artifacts and memorial landscape. The majority of individuals observed or referenced in this study were local residents, and much of their behavior demonstrated priorities related to rest and relaxation for their visit. Instead of interaction with the history, they often approached the site as a park landscape even if they knew the memorial's designed intent. This could derive from a few possible reasons, including the following conjectures:

1. The influence of memorial regulation on behavior is somewhat mutable for those that interact with it regularly—in unusual circumstances such as a pandemic, the memorial in essence 'turns off' for locals and assumes a role of non-specialized outdoor space.
2. The unusual circumstances of a pandemic take precedence over 'normal' memorial functions; since tourists and memorial guides are largely absent and residents lack personal outdoor space, the memorial function can shift to accommodate the local needs of the moment.
3. The specialized function of the site as an historic memorial is perceived to be designed for foreign tourists and non-locals instead of local residents. Locals have always perceived it as simply another open space, but they by-pass it to recreate elsewhere. Tourists function as a kind of regulatory mechanism on behavior at the site—their very presence creates the perception of its special memorial functions. With tourists' absence, residents may feel free to use the site however they would wish during typical times.

While all three options insinuate that soundscape judgements are subject to shifts, the last possible reason points to a critical point of consideration for soundscape research. Other recent studies proved a shift in behavior as well; an increase in the perceived eventfulness reflected changes in people's outdoor activities and behavior, although the measured overall loudness remained stable [3]. Does the shift in behaviors at the memorial by locals indicate a shift in their perception, or does it indicate an underlying perception that could not be studied without the exceptional circumstances of the pandemic?

Take, for instance, the relationship at the site between locals and silence. As discussed earlier, residents do not match the surrounding quiet as tourists and staff do. Is this because the visitors do not come with touristic expectations and sensitivity to harmonize with their surroundings, be it during a pandemic or other times? Do residents feel a sense of possession over the territory and now, during the pandemic, have the ability to dictate their own terms of interaction? It is possible that such a dynamic is never witnessed simply because tourists usually dominate the landscape—or perhaps a shift has taken place because of the pandemic and the special silence it has introduced all over the world. The silence that fell over cities during the early days of the pandemic was described as eerie and apocalyptic [48–51]. Perhaps the perceived quiet at the site was seen by residents as a condition to push back against and break themselves.

Or has the influential power of quiet changed during the pandemic? This question harkens to an earlier period and bears a moment of historical positioning. During German division, silence was weaponized on the East, a tool of surveillance and control that spelled disaster when broken. When the Wall fell, the deathstrip was flooded with visitors—the initial waves of celebrants gave way to children on school trips and wall-peckers (*Mauer-spechte*) extracting graffitied souvenirs day and night. The memorial brought quiet to a section of the Wall while much of the rest of the original Wall's 140 km stretch throughout the city was gradually redeveloped. The year 2019 was the memorial's busiest year before the pandemic changed the sonic terms again. Whatever the mixture of conditions and influences involved, the contextual perception of the memorial soundscape cannot be assumed to be static in time or similar between user groups. Now, as Reuschenbach observed, the harnessing of relative silence yet again may be key to enabling visitors to relate to the memorial and its history. Actively controlling the soundscape could be a strategy for organizing the site when pandemic restrictions cease. Perceived silence has never been conditionally or symbolically fixed along Bernauer Strasse.

It is also important to consider the differences in behavior people may demonstrate between participating actively in a formal and recruitment-based study versus being approached while already at the site. This also applies to the results of distant observational study included in this study that entailed no personal engagement. Variable influences from different study methods and participant mixes cannot be ruled out. Generally, the findings here point to the necessity of soundscape studies to include a simultaneous mixture of participant study methods, reinforcing previous such calls [6].

6. Summary and Directions for Future Research

Observations made in 2021 at the Berlin Wall Memorial made apparent that the memorial soundscape, and one's perception of and interaction with it, are highly dependent on both physical and perceptive contexts. In fact, it is the combination of the two that yielded insight into the dynamics observed in 2021 contrasted to pre-pandemic times. Though the physical context (in terms of sound levels) was almost identical to previous conditions, it was perceived to be quieter, likely due in part to compositional changes (fewer tourists, different activities taking place in the landscape). Exploring this dynamic further, members of stakeholder groups appear to share perceptual cues and associations (such as the perception of relative quiet), yet the behavioral responses can differ—and even conflict—between groups. For instance, while silence is matched by many tourists in normal times, it is disregarded by many residents during the pandemic, indicating that *situational norms* may vary between groups or be less impactful during abnormal circumstances. Furthermore, such cues and associations were shown to vary over time, as with the case of silence at the site; this is particularly important in a memorial, which attempts to maintain historic experience but cannot control evolving perceptions through time.

One of the primary findings of previous study at the Berlin Wall Memorial was that motivation in visiting an historic site could change the expectations and perceptions of visitors. Observations in 2021 bear this observation out once again—locals have been visiting the site largely for recreational rather than pedagogical purposes in a well-appointed outdoor space during the pandemic. However, the recent findings also demonstrate that there is no single soundscape in one location—its perception is based on the user and her contextual background. While this is acknowledged theoretically in soundscape standards, the research at the Berlin Wall Memorial suggests a way to fold such differences productively into a research study. The identification of user groups that share common perceptual and motivational frameworks has made it possible to understand how users share contextual reference points (historic events, silence) yet perceive and interact with the soundscape differently. At Bernauer Strasse, user groups are substantially defined by a combination of their proximity and familiarity with the site and their historical investment—a key difference between a local staff member and a local resident. User groups at other sites will have different contours to identify. However, historic sites will always be an intricate mix of audiences and layered contextual reference points through time, and these must be properly identified ahead of any soundscape work focused on perception.

One additional factor in historic site soundscape assessment was observed along Bernauer Strasse in 2021: the strong possible effect that tourists impose on the soundscape and its perception by other users. This observation will come as little surprise to those who have witnessed mass over-tourism and how crowds of tourists can dominate a sonic environment. However, the implications for future soundscape research from this observation cannot be overstated. Not only must context be studied across user groups, but soundscape contexts must also be approached as co-created when these groups interact, either overtly or in more subtle behavioral ways. The effects of tourism on the memorial soundscape were not questioned in the previous study; only pandemic conditions allowed for an alternative, locally derived perceptive reality to dominate and be the subject of study. The memorial demonstrates how context is dynamic on an individual level, on a group level, and through time. Furthermore, 2021 observations demonstrate how difficult non-dominant user group perspectives can be to collect under 'normal' conditions.

As the soundscape of the memorial acts in multiple ways to reinforce its pedagogical intent, more research at historic sites is needed to absorb these observations into standard soundscape research and design practice and sufficiently incorporate all user priorities. Ultimately, a soundscape design must account for the potentially divergent perceptions and desires of multiple stakeholders, particularly in settings intended for purposes beyond pleasant relaxation.

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