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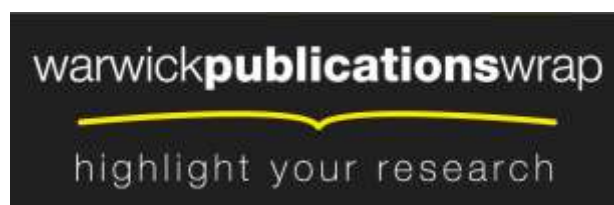
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NOISE CONTROL FOR QUALITY OF LIFE

Measuring the perceived restorativeness of soundscapes: is it about the sounds, the person, or the environment?

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ABSTRACT

To determine the 'restorative aspects of sound exposure' a reliable and valid measure is needed. A Perceived Restorativeness Soundscape Scale (PRSS), which measures the level of Fascination, Being-Away, Compatibility, and Extent (FACE), has been proposed and shown to be reliable. This study aimed to test its validity further by establishing the comprehension and interpretation of the scale's items. Ten participants completed a questionnaire involving adapted items of the PRSS. Half the questions were phrased in relation to the soundscape (holistic), the other, near, identical half were phrased in relation to the sounds (specific). Participants rated their agreement with each item using a 7 point Likert scale and wrote the reason for their response. A semi-structured interview followed the questionnaire, which took place in two urban cafés. The question framing (holistic or specific) did not result in varied responses for these matched items. However, depending on the FACE component being measured responses varied in their reference to a) the place, soundscape, or individual sounds, and b) the individual's moods and desires, or the temporality of the sound(scape). Increased understanding of FACE components and amendments to the PRSS are necessary to improve the scale's comprehension and validity.

Keywords: Soundscape, Restoration, Measure

1. INTRODUCTION

Soundscapes have garnered increased research attention over the last decade in different fields of practice (e.g. noise control, urban design, wilderness management) and disciplines (e.g. acoustics, ecology, psychology, sociology)[1]. Various definitions and synonyms for 'soundscape' have been proposed[2; 3; 4; 5]; but nearly all are in common with their emphasis on the way the acoustic environment is perceived and understood by the individual, by a group, or by a society[6]. Central to soundscape research is the recent paradigm shift from quantitative analytic approaches (e.g. psychophysics) to more holistic qualitative cognitive approaches focusing on meanings attributed to soundscapes in relation to human activities[7; 8; 9]. Indeed, there is converging evidence that soundscapes cannot be assessed exhaustively in terms of acoustic measurements as humans typically evaluate the meaning of the activity, source and/or agents producing the sound.

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This has resulted in a number of studies examining people’s assessments of different types of sound sources, with converging evidence that natural sounds are positively judged and preferred over mechanical sounds in urban areas [10; 11; 12]. Despite general preferences there is also some indications that groups of people vary in their preferences towards hearing certain sound sources, such as older people preferring natural sounds over younger people[13; 14]. The context of the sound can also influence people’s assessment of the sound[5]. Therefore when rating a soundscape, it is important to establish if the rating is based on the sounds heard, is specific to the person making the rating and their activity, or is influenced by the surrounding environmental context, rather than the sound per se.

One important activity for humans is their need for restoration, which is defined by Attention Restoration Theory (ART) as an individuals’ need to recover from attentional fatigue and reflect upon daily or life issues [15]. The idea that soundscapes can help with humans psychological restoration is growing [16; 17]. To be able to determine the ‘restorative aspects of sound exposure’ a reliable and valid measure is needed. The Perceived Restorativeness Soundscape Scale (PRSS) was developed to measure the perceived level of the four theoretical ART components, Fascination, Being-Away, Compatibility, and Extent (FACE), in relation to sounds [18]. Although the PRSS was found to be reliable across a number of environments [18], it does not use everyday language that is easy to comprehend. This is particularly problematic as people are not used to discussing sounds to the same extent as visual aesthetics and in comparison have a limited vocabulary [10]. This research examines the structure of the present PRSS items and aimed to test its validity further by establishing the comprehension and interpretation of the scale’s items.

2. METHODOLOGY

2.1 Environment

Interviews were conducted in two downtown cafes in Montréal, Canada. Weather conditions dictated the use of indoor environments and cafés are familiar environments that may be visited for restoration. The two cafés were distinctly different as can be seen in Figure 1. Café A had expansive windows on the outer ‘wall’ resulting in little need for artificial lighting and the adjacent busy road and pavement was clearly visible. Overall, it had a rustic theme, basic chairs and tables, as well as a service counter at the entrance displaying food. Café B was enclosed by a small internal wall to separate the café from the surrounding thoroughfare to apartments and a small shopping complex. The café relied on artificial lighting and had considerably fewer customers during interviews than Café A. Overall, it had a modern luxurious theme, and an open plan kitchen on one side. Both café’s had a muted television but music or a radio station was heard from the array of speakers.

Figure1 – Images of Café A (top two) and Café B (bottom two)



2.2 Participants

Ten English speakers participated in the study (7 females and 3 males). They were aged 20 to 47 years (median=25 to 34 years). Nine participants had some level of music experience, ranging from playing instruments outside of school (n=7) to a professional sound engineer (n=1). In general participants reported being fairly sensitive to noise ($\bar{x}=5.5$, $\sigma=1.27$) and very aware of sounds ($\bar{x}=5.9$, $\sigma=1.45$). On average participants visited a café weekly, thus it was a familiar setting. Participants visited cafés for a variety and multiple reasons; largely cafés were used for socialising (n=8), food and drink (n=6) and work (n=5).

2.3 Measures

Two sets of near identical PRSS items were developed (see Appendix). One set was phrased in relation to the holistic soundscape (e.g. “I rapidly adapt to this soundscape”), the other set in relation to the specific sounds (e.g. “I rapidly adapt to these sounds”). Each set contained 22 items, but all 44 items were presented in one questionnaire in a random order. In each set there were four items measuring Fascination, six for Being-Away, four for Compatibility, four for Extent – Coherence, and four for Extent – Scope. All items were rated on a seven point Likert scale from completely disagree (1) to completely agree (7). Each item was followed by a space to provide the “reason for your chosen response”.

2.4 Procedure and Analysis

Participants were recruited via a community Internet website (craigslist) advertisement for a study on the experience and evaluation of urban places. Participants were met in one of the urban cafes during a weekday, between 10am-12pm (n=3) and 3-6pm (n=7), in January 2010. Participants were asked to consider the soundscape and sounds for 30 seconds before listing them. The extended PRSS was then completed. Participants could ask questions at any point. Finally, demographic questions were asked before debriefing. The whole process took around an hour to complete and was recorded on Dictaphones. Participants received \$10 and a hot drink for taking part. Analysis of numerical data was via descriptive statistics only due to the small sample size and the aim was to understand the reasons for the given values, not to examine the values per se. The free-format responses were analysed using Grounded Theory, by coding responses and collating them into themes [19].

3. RESULTS

The framing of the question (holistic or specific) resulted in little variation between numerical ratings for each set of matched items (median=1, with 41% having no difference). However, depending on the ART component being measured, free form responses largely varied in their reference to a) the place, soundscape, or individual sounds, and b) the individual’s moods and desires, or the temporality of the sound(scape).

Participants’ comments identified that their slightly low ratings of Fascination (mean and standard deviation across all participants: $\bar{x}=3.23$, $\sigma=1.37$), were often based upon references to individual sound sources (20%; e.g. “footsteps, radio...” “they”, “sounds”) rather than the soundscape or place (5%). The other ART components however, were not so clearly focused on the individual sounds rather than the soundscape or place. For Being-Away items, participants referred to individual sounds (13%) as often as discussing the soundscape and place (13%; e.g. “I’d opt for silence”; comparison of café to other places). Compatibility items ($\bar{x}=4.13$; $\sigma=1.67$) were largely described in place related terms (43%) such as how the soundscape did or didn’t match their desired activities compared to other places. The café soundscape was considered fairly Coherent (Extent; $\bar{x}=4.91$; $\sigma=1.07$) and involved descriptions of individual sound sources (39%) and the café and its activities (22%). Whereas Scope (Extent) ratings, despite listing sounds (26%) and soundscapes in relation to the place (16%), the influence of the acoustics on their ratings were uncertain “3=I’m not sure if it’s the soundscape or the design”.

For each visit to a café, an individual may do different activities (work, socialise) or be in a different mood. This resulted in a neutral rating for the soundscape in terms of Being-Away ($\bar{x}=4.19$; $\sigma=.85$) as participants’ comments emphasized their variability (23%; e.g. “4=depends on my level of distractability”). In contrast, few comments suggested individuals’ ratings of Fascination (10%), Compatibility (8%), Extent-Coherence (0%), and Extent-Scope (9%) of the sound/scape would vary depending on the individual’s mood and intentions. However, comments on rating the sound/scape’s

Compatibility with their intended actions did involve a lot of self-referencing (29%), but not with an emphasis on how this would vary over time or place (e.g. “6= I adapt to anything”).

Temporal changes in the environment and its subsequent effect on the soundscape (e.g. different people, speaking at different levels, and in different languages) influenced Fascination ratings (16%). There was also a tendency to rate more temporally varied soundscapes as more fascinating than those that “soon become contained and monotonous”. Changes in the soundscape over time affected its Scope (Extent) ratings (13%), thus resulting in a neutral rating ($\bar{x}=3.97$; $\sigma=1.14$). This was because the presence and absence of individual sounds influenced how closed the soundscape felt and the distance from which sound sources could be heard e.g. “it just got really quiet, and I’m hearing the outside environment more”. The Compatibility (8%) and Coherence (Extent; 8%) of the soundscape was only occasionally said to alter with time as different sounds dominated.

4. DISCUSSION

In the context of assessing the restorative potential of an acoustic environment, the framing of the question either holistically (soundscape) or specifically (individual sounds) did not influence the items rating or how the item was interpreted. As individual sound sources were not named in the items and sounds were referred to plurally, the specific items were interpreted in relation to the soundscape. Additionally, as people find it harder to describe soundscapes compared to individual sounds[20], holistic items were interpreted in relation to the identification of a number of individual sound sources. Previous research has highlighted differences between holistic listening (focus on the soundscape as a whole, as ambient noise) and a descriptive/analytical listening (focus on specific sound sources or events)[7; 21; 22] however, the framing of these questions did not result in the assessor switching between these two styles of listening. Instead the attentional restoration theory component, FACE, being measured influenced the style of listening and interpretation of the restorative assessment item. This resulted in the Perceived Restoration Soundscape Scale items being interpreted with an emphasis on the place, the individual sounds, or the soundscape, alongside recognising the potential variability in ratings because of the individual or soundscapes altering with time.

Items measuring Fascination tended to be interpreted in relation to individual sound sources and with a recognition that the sounds can change with time. This suggests that it is the individual items within a soundscape that determine if a place is perceived as fascinating; the specific features that the place contains, enhances or detracts its restorativeness. Being able to focus and identify, or be intrigued in the identification of, individual sounds seems to be of greater interest than the collection they form. The temporality of these individual sounds changing over time also enhances the fascination, and thus the potential for restoration. This is similar to visually restorative features, whereby natural elements of trees and water, which change daily and seasonally are generally more restorative than static urban features of buildings and car parks[23].

The Coherence (Extent) of the soundscape was also interpreted in relation to individual sound sources, through identifying sounds that were or were not coherent with the place. This suggests a descriptive form of listening was again used to rate Coherence. Incoherent soundscapes would arise because a particular sound, or two, causes a ‘clash’ with other sounds or does not fit with the place in which it is heard, therefore, to determine the coherence of a soundscape, the fit of the individual sounds needs to be evaluated and identified. Additionally, as little variation was noted to occur because of changes in the individual, it was as if participants considered they were rating a “perceived reality”, the sounds were either coherent or they weren’t and this would not change much over time. The lack of a personal pronoun in the Coherence items however may have influenced this way of thinking.

In contrast to Fascination and Coherence, Being Away and Compatibility items were interpreted with a strong focus on the variation that individuals can have on ratings, as well as how the specific place and the activities that can occur there impact on the soundscape. Interpretations of Compatibility items involved the capabilities and prior experiences of the individual influencing their ratings, but in a stable way that would not change over time. Similarly, the place in which the ratings are made, in this instance a café, are largely going to consist of the same activities, thus the same sound sources, and sounds will be heard over time. This places the emphasis on what the individual wants to do and whether the place will offer this, which in turn influences if the soundscape will be compatible as the activities that occur there will largely generate the soundscape (unless sounds from surrounding places impose on the soundscape). This is consistent with a recent listening test showing that soundscapes carry information about the types of actions listeners may perform in the environment, and that the

evaluation of soundscapes varies as a function of the activities envisaged by the listener[9]. Therefore, given that activities play a large role in rating Compatibility items, ratings can vary across one individual for a given soundscape that reflects the potential for more than one activity. This has implications for combining individual ratings for the restorativeness of a soundscape using the PRSS.

5. CONCLUSIONS

Soundscapes vary over time (minutes/hours) and this can affect people's perception of them as 'restorative', particularly in their Fascination and Extent ratings. Importantly, as an individual changes their activities their perception of the soundscape as restorative also varies, particularly for Being-Away and Compatibility ratings. These results therefore highlight the complexity involved in defining a soundscape as 'restorative', and has implications for measuring and designing 'restorative soundscapes' within multi-purpose environments.

Further data analysis is being conducted into the words and expressions used by participants to explain their ratings. This is to ensure the Perceived Restorativeness Soundscape Scale items are measuring their intended concepts accurately and to adapt the item wordings where necessary to ensure their interpretation of the item matches its conceptual definition. Additionally through examining the language used by the participants the comprehensibility of the items for public participants can be improved

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APPENDIX

FASCINATION

I find this soundscape fascinating	These sounds, I find fascinating
Following what is going on in this soundscape really holds my interest	My interest is really held by following what is going on with these sounds
This soundscape awakens my curiosity	My curiosity is awoken by these sounds
There is plenty for me to discover in this soundscape	There are plenty of sounds for me to discover

BEING-AWAY-FROM

When I am in this soundscape I need to think of my obligations	I need to think of my obligations when I am with these sounds
When I am in this soundscape I feel free from work and/or responsibilities	I feel free from work and/or responsibilities when I am with these sounds
This soundscape demands my concentration	My concentration is demanded by these sounds
This soundscape is a refuge for me from unwanted distractions	These sounds are a refuge for me from unwanted distractions
I experience few attentional demands by this soundscape	From these sounds, I experience few attentional demands
Spending time in this soundscape gives me a break from my day-to-day routine	I get a break from my day-to-day routine from spending time with these sounds

COMPATIBILITY

I rapidly adapt to this soundscape	I rapidly adapt to these sounds
It is easy to do what I want while I am in this soundscape	While I am with these sounds, it is easy to do what I want
Being in this soundscape fits with my personal inclinations	My personal inclinations fits with being with these sounds
There is an accordance between what I like to do and this soundscape	There is an accordance between these sounds and what I like to do

EXTENT – COHERENCE

This soundscape is coherent	These sounds are coherent
This soundscape is clearly organised	The sounds are clearly organised
There is a clear order in the physical arrangement of this soundscape	The physical arrangement of these sounds has a clear order
The sounds fit together to form a coherent soundscape	The existing sounds belong to this soundscape

EXTENT-SCOPE

This soundscape is large enough to allow exploration in many directions	There are plenty of sounds to allow exploration in many directions
It seems like the extent of this soundscape is limitless	The extent of these sounds seems limitless
This soundscape feels very spacious	These sounds feel very spacious
This soundscape has the quality of being a whole world to itself	These sounds have the quality of being a whole world to themselves