Applied Acoustics 85 (2014) 1–11

Contents lists available at ScienceDirect

Applied Acoustics

journal homepage: www.elsevier.com/locate/apacoust

The effects of expectation on the perception of soundscapes

Neil S. Bruce *, William J. Davies

Acoustics Research Centre, Newton Building, University of Salford, Salford M5 4WT, UK

ARTICLE INFO

Article history:
Received 2 July 2012
Received in revised form 18 March 2014
Accepted 25 March 2014
Available online 23 April 2014

Keywords:
Soundscape
Soundwalk
Expectation
Context
Competence
Perception
Noise

ABSTRACT

This paper explores how expectations of a place and its soundscape can affect our perception of that soundscape. Previous soundscape research has included expectation as one possible element of the context in which soundscape evaluation takes place. This work aimed to focus on expectation and unpack it to improve understanding of its different components and how it works. A combination of soundwalks, interviews, focus groups and an interactive soundscape simulation were used in the investigation. A linked series of locations in Manchester and London were studied. It was found that participants' perceptions of a soundscape, both real and simulated, were affected by expectation in several different ways. Participants expected certain types of sound to be present in a particular space. Participants distinguished between whether a sound was expected and whether it sounded pleasant. It was also possible to distinguish between the expectation of particular sound sources and the expectation of the soundscape as a whole. The latter was found to be driven significantly by prior experience of similar spaces and also by perceived loudness. Participants also had expectations about the type of activity they could undertake in a particular soundscape, the behaviour of other people as expressed in the soundscape, and the degree of control they might have over their own exposure to the sound. These findings suggest that expectations of a soundscape are based on prior experience in a way which is consistent with Truax's notion of soundscape competence. The results have been used to produce a new model for soundscape expectation which is expressed as a flowchart.

1. Introduction

"Soundscape" is a term originally attributed to Murray Schafer, and soundscape research is growing in quantity and influence, to the extent that the term now has a proposed definition from an ISO working group [1]: the "*perception and understanding of an acoustic environment, in context, by the individual, or by a society*".

Existing soundscape studies have investigated subjective response to soundscapes using a number of techniques, including qualitative interviews, rating scales and questionnaires in the field [2–5] and by the playback of field recordings in the laboratory [6,7]. There is now a strong focus on the use of interdisciplinary collaboration as part of soundscape research [8–10]. However, relatively few studies integrate the two methods of in situ subjective work and laboratory based reproduction.

Community noise control often suggests that reducing noise levels is beneficial, although it has been shown that sound level is not necessarily the main factor affecting soundscape perception [11,12,13]. For example, Kang suggests acoustic comfort evaluation where types of sound sources, users of a space, and social factors play a role in perception [14]. Combining these factors could form a "context", a concept that Botteldooren suggests is crucial in a cognitive approach to soundscapes [15]. If spaces have a context, then it is possible that the individual's expectation of a context is a key factor in their perception of that space. It follows that design and planning regulations should consider perception and that they should be "*based on the assumption that people expect different sonic environments for different space*" [14].

Context can be defined as the "*circumstances that form the setting for an event, statement, or idea, and in terms of which it can be fully understood and assessed*" [16]. Context and meaning in soundscapes have been explored by a number of researchers [5,17,18]. Dubois et al. found that context (the type of noise, type of source and the meaning attributed to it) were more important than noise level in soundscape evaluations [19].

It is clear that the term context covers a range of factors that potentially affect soundscape perception. One of these is expectation: listeners have expectations of how a location or source will

* Corresponding author. Tel.: +44 (0)161 295 6144.
E-mail addresses: n.s.bruce@salford.ac.uk (N.S. Bruce), w.davies@salford.ac.uk (W.J. Davies).

http://dx.doi.org/10.1016/j.apacoust.2014.03.016
0003-682X/

sound. Botteldooren and De Coensel [18] proposed expectation as part of a framework of cognition and emotion when perceiving soundscape contexts [18].

Expectation can be defined as "*A strong belief that something will happen or be the case in the future, or the series of events which are anticipated prior to an experience*" [20]. Expectation is used in this paper in regard to the likelihood of events happening, and the anticipation of the occurrence of events, in relation to the soundscape context. Huron in his work on the psychology of expectation likens expectation to a cliché; a stereotype for a context or situation [21].

Our expectations for the soundscape of a location must have a basis. A plausible basis for expectation is the concept of soundscape "*competence*" proposed by Truax [22]. Truax describes soundscape competence as "*tacit knowledge*" that a person has about the structure of a soundscape as they experience it [22]. Tacit knowledge is subjective knowledge, which is related to an individual's experiences, and is comprised of factors such as their personal beliefs, perspective, ideals, values, emotions and mental models [23]. These factors are generally taken for granted and as such cannot be easily identified, but they shape the way we perceive the world around us.

Soundscape competence suggests that soundscape structures, which comprise of all the acoustic elements which form a soundscape are learnt through experience, and that this forms a relationship between sound and its associated meaning [22]. These structures relate to the context of a space in which a person is present. There is little existing research explicitly addressing the effects of expectation on the perception of a soundscape, though the concept of auditory expectation is not new in the study of music [19,24].

The literature discussed above suggests that context is important in soundscape evaluation, and that expectation might form a significant part of this context. Truax's notion of soundscape competence is one possible explanation for how previous experience is codified into a cognitive structure to produce expectation. Fig. 1 is a simple process flow diagram which suggests how expectation may work in practice to influence evaluation of a soundscape.

There is little existing research on soundscape expectation to suggest whether expectation itself has more than one component or factor (and, if so, which are the most important). It seems possible that expectation is more complex than Fig. 1 suggests. If expectation has an influence, then we might ask: Do people have expectations of sound sources, sound categories, whole soundscapes, or all three? How does expectation of a place or location (visual etc.) influence expectation of its soundscape (and vice versa)? How does expectation vary with (type of) place? Are expectations of social factors like behaviour and activity related to soundscape expectation? And do expectation and experience link in the way suggested by the idea of soundscape competence? The work described in this paper aimed to answer these questions.

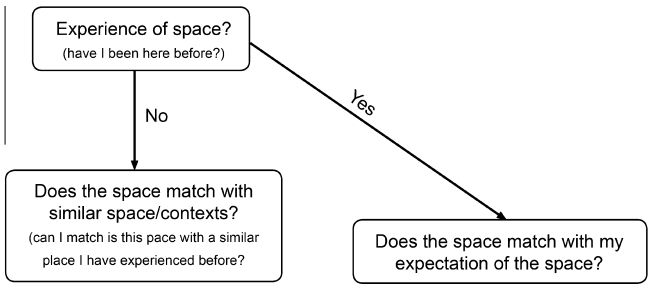

Fig. 1. Expectation process flow.

2. Method

To investigate expectation thoroughly a combination of field and laboratory methods were used. Field research consisted of soundwalks in Manchester and London. Laboratory research used two techniques: focus groups and soundscape simulation.

2.1. Soundwalks

Soundwalking is a method where participants partake in a walk through a space or series of spaces, and answer questions based on their experience [25]. The traditional Schaferian soundwalk, with an hour's walk and discussion at the end was found to be less effective than a method involving regular stops. [25,26]. An enhanced soundwalking methodology was developed and used in this work. The method required the participant to walk in silence over the course of a predefined route, observing the soundscape and the environment. Throughout the walk, the participants were subjected to semi-structured interviews, which took place at specific locations.

During the soundwalk interviews, conducted in Manchester and London in 2008 and 2009, participants were asked questions relating to a set of specific locations they visited. Upon embarking on the walk, the group or individual walks for 5–10 min, and was then asked to stop and listen to the new environment for 1 min. This procedure was to enable participants to acclimatise themselves to the space. The soundwalk interviews were recorded and then later transcribed, the transcription process allowed for content analysis [27,28] via coding taking place on the text.

Participants were recruited from a variety of sources. Recruitment sources included contacting interested parties such as local residents, professional bodies, and by direct contact. 42 soundwalk participants aged between 22 and 65 years old took part in soundwalks in London and Manchester.

Prior to the soundwalk, a walking route was designed. This process required the researcher to walk around a chosen city looking for a number of contrasting listening locations, to provide what could be seen to be different contexts [18], to test if there was any similarity between perceptions of certain types of space, and if there was any correlation between perceptions of the spaces. Table 1 shows that the soundwalk routes were similar in that each featured one public square, one green space, and so on. This was to allow comparison of responses between Manchester and London. Fig. 2 shows the soundwalking locations used and Table 2 lists the interview questions.

2.2. Focus groups

As well as the soundwalks, four focus groups were conducted. A focus group is simply a discussion on a specific issue facilitated by a researcher. Naturalistic discussion allows ideas to emerge and be tested by the group, so that the researcher can potentially capture detailed and relatively unbiased opinions. This method is well suited to explore how people understand sound in the urban environment and the way it might influence their behaviour and feelings. Focus groups have contrasting merits when compared to soundwalks. Soundwalks capture participant response to a real environment at the time of exposure. Focus groups allow for reflection on previous experience of soundscapes and testing of the ideas expressed, as well as the potential for producing an agreed group response. The four focus groups used different participants: adults aged 18–25, adults aged 60 or older, adults with moderate to severe hearing loss, and design professionals. The prompt questions for the focus groups started from the soundwalk interview questions, but were extemporised as the group discussion evolved.