

The Soundscape and the Response to Music

Subjects: **Music**

Contributor: David Welch , Mark Reybrouck , Piotr Podlipniak

The sound environment and music intersect in several ways and the same holds true for the soundscape and our internal response to listening to music. Music may be part of a sound environment or take on some aspects of environmental sound, and therefore some of the soundscape response may be experienced alongside the response to the music. At a deeper level, coping with music, spoken language, and the sound environment may all have influenced our evolution, and the cognitive-emotional structures and responses evoked by all three sources of acoustic information may be, to some extent, the same.

music

soundscape

sound environment

soundscape descriptors

1. Conceptualising the Soundscape

The concept of soundscape has a rather short history, which means that it may still have flaws and weaknesses. It has a background in acoustic ecology ^{[1][2]}, but research within the field of musicology is rare and to some extent still lacking. There are some contributions from ecomusicology—a discipline at the intersection of music, sound, culture, society, nature and environment ^{[3][4]}—and ethnomusicological research ^[5].

As is the case in new emerging fields in science, there is, at first, an immature stage that is characterized by disagreement on principles, methods and even accepted facts. It means that scholars still have to come to agreement on a unifying paradigm to guide their research ^[6]. There are, as such, many related terms that are used interchangeably without always providing clear and valid definitions. This holds, first of all, for the concept of soundscape, which is closely related to the acoustic environment and the way this is perceived. Within this construct, a distinction must be made between soundscape design, soundscape descriptors, and soundscape appraisal, with a dynamic tension between objective, acoustic descriptions and subjective evaluations of these environments ^{[7][8][9][10][11][12][13][14]}.

The concept started gaining traction after the establishment of The World Soundscape Project by Schafer during the late 1960s and early 1970s as the outgrowth of his initial attempt to draw attention to the rapidly increasing noise pollution of the acoustic environment ^{[15][16]} and follow-up studies by Truax. It was an approach that gave impetus for soundscape ecology, as an umbrella term for landscape ecology and acoustic ecology ^{[17][18]} as a logical prolongation of Schafer's soundscape studies. In an effort to propose a positive alternative to previous negative, anti-noise, approaches, he proposed a listener-based approach relying on technique of “ear cleaning” and “soundwalks” to counter the negative effects of soundscapes that produced a habituated response of non-listening to the acoustic environment.

The term soundscape has been described by Truax as “an environment of sound (sonic environment) with emphasis on the way it is perceived by a person or people, or by a society” ^[18] (p. 126) (and see also ^[13]). Since those days, the term soundscape is defined in two main ways: one, as defined by the International Standards Organisation in ISO12913 is the “acoustic environment as perceived or experienced and/or understood by a person or people, in context” ^[19]; the other is as a synonym for the acoustic environment. The researchers will adopt the former usage, so consider the soundscape to be a perceptual phenomenon, that is influenced by the sound environment, but also by other sensory information, memories, and states and traits of the person in which it manifests.

The sound environment should be seen as a necessary and influential precondition for the soundscape, and has been considered in detailed research in the context of *auditory scene analysis* and the related search for auditory streams in the environment ^{[20][21][22]}. This field addresses the problem of how listeners can hear in complex auditory environments by integrating findings from psychoacoustics, speech perception, music theory and composition, and computer modelling. A major challenge in this regard is to distinguish between the massive overlap of meaningful acoustic signals and the sounds from the wider surroundings. It is still a matter of debate whether the former may trigger our attention in a quasi-automatic way or whether they are the outcome of a listener’s focus of attention, though there is some agreement about the attention-capturing potential of some stereotypic sounds ^[23].

Schafer’s original distinction between *hi-fi* and *lo-fi soundscapes* can be considered as an interesting starting point in this regard. Starting from the signal to noise ratio, he conceived of a hi-fi system as one in which “discrete sounds can be heard clearly because of the low ambient noise level”, while “in a lo-fi soundscape individual acoustic signals are obscured in an overdense population of sounds” ^[24] (p. 32). The countryside is more hi-fi than the city, and ancient times were also more hi-fi than modern times. The distinction, however, has consequences for the processing of information, and, above all, for the processing efforts, in the sense that in a hi-fi soundscape even the slightest disturbance can communicate interesting and vital information. It allows the ear to function as a sentinel, celebrating its primary alerting and motivational role in preferring certain environments and avoiding others. Hi-fi soundscapes, therefore, should be favorable for survival purposes since they make the signals easier to process, thus reducing the complexity of their analysis (see also ^{[13][25]}). In lo-fi soundscapes, on the other hand, individual acoustic signals are mainly obscured by the masking effect of a population of sounds. Everything is “close-miked” with cross-talk on all the channels, with the resulting need of amplification of even the most ordinary sounds to be heard. It is clear that this has consequences for the ecology of listening ^[26].

The complexity of soundscapes refers to the number of competing auditory streams in a larger search space ^[20] and the related difficulty to process its available affordance content in terms of appropriate behavior ^[27]. It brings us to the second part of the definition, namely the decision-making process of meaning attribution and appraisal of the environment. This seems to be determined to a great extent by the degree of subjective control (see ^[13] for an overview).

There have been several attempts to describe how people perceive the acoustic environment, defined in operational terms as soundscape descriptors, which provide a dimensional structure of soundscape indicators, and which reflect meaning attribution rather than merely describing the physical characteristics of the sound [7][11]. These descriptors have been generated in a variety of ways and from different theoretical backgrounds, which is a likely explanation for the range of different types. One class of soundscape descriptors has arisen from questionnaires that are restricted to affective aspects of the soundscape, e.g., [28], and have a theoretical basis in Russell's work on the two dimensions of affect [29]. In this work, dimensions mirroring Russell's two dimensions, Pleasantness (emotional valence) and Eventfulness (vibrancy) have been identified [11][30]. A calm environment affords indications of safety and allows people to restore resources; a lively environment is stimulating and safe and makes it possible to learn and play; a boring environment does not guarantee a sense of safety and control; and a chaotic environment contains indications of insecurity and danger [13]. Other related work has preserved the pleasantness/eventfulness dimensionality and added a third component: "Familiarity" [8], the sense that a soundscape is known; "Restorativeness," the sense that a soundscape helps people to recover from tiredness or malaise [31], or "Appropriateness," a sense that the soundscape is right for the place in which it is experienced [27].

Other research has included qualia of the sound environment in addition to the affective aspects. Originally, qualia referred to the intrinsic qualities of a subjective experience that is associated with a given sensory object [32]. In more recent research, the term has been used to describe subjective experience more broadly [33] and also in musical contexts [34]. It may be that, in the context of listening to sound, people do not distinguish their emotive responses to the sound from the experience of the sound itself: the qualia.

This has added greater dimensionality to the picture. For example, one model has produced descriptors: "Relaxation", "Communication", "Spatiality," and "Dynamics" [35]. Interestingly, in these models, people do not separate the affective aspects of the soundscape cleanly from the qualia. For example, one model provided: "Uplifting" as a purely affective component, "Hectic" and "Stable" as purely related to the qualia of the sounds, and "Demanding", which combines the influences on both affect and qualia [36]. This may imply that people do not separate their emotional response to a sound from the experience of hearing the sound.

2. Conceptualising the Musical Experience

Like the soundscape, different models have been developed to attempt to explain how we perceive music and how it influences us emotionally [37][38]. As with attempts to model the soundscape, research into the response to music has been based on theories of emotion. In particular, Russell's model, capturing the two dimensions of emotional valence and arousal has been influential [29], though the application of the model to musical experiences anticipated Russell's work by over four decades [39]. A model of the emotional response to music that is unlike any as yet proposed for the soundscape is a hybrid model [36], which captures three levels of emotional response to music: low-level, core affect; phylogenetically older basic emotions; and high-level phylogenetically younger emotions such as nostalgia or awe, which are not captured by the simpler emotional states of the lower levels. On the other hand, this division of emotions according to levels can be contrasted with a functional perspective in which each emotion evolved separately and because of different functions [40].

Another important aspect of the response to music which has received little attention in the soundscape field was also anticipated by Hevner, when she referred to music as a “temporal art” [\[39\]](#) (p. 201), emphasizing the ever-changing nature of music, and that it is changes (e.g., in pitch or rhythm) within a piece of music that leads to changes in affect in a listener. More recently, the inability of theories of emotion to capture the ever-changing and complex flow of emotions that humans experience has been commented upon by McCrae [\[41\]](#), raising the intriguing idea of the potential for music to illustrate or capture those changes. In recent research investigating the soundscape using a questionnaire followed-up by interviews, participants referred to the difficulty of expressing their experience of an ever-changing soundscape using a questionnaire completed at a single point in time [\[42\]](#). Perhaps a truer approach than a static questionnaire to describe soundscapes may be through a form of musical composition, as suggested by McCrae, that allows a listener to extract and present the salient aspects of the soundscape through a more dynamic medium.

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