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The new expert concept: sound or not ?

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ABSTRACT

Prominent descriptions of soundscape reveal significant commonalities. At first, they share the view that soundscapes basically are about the structure of the sonic environment, that is, about the relationships between its constituent parts (see, e.g., keynote sound, soundmark). Secondly, soundscapes are not equated with sonic environments but are generally viewed as distinct. The distinction is most often made by explicit reference to perceptual processes. In line with modern hearing and perception terminology a soundscape could be defined succinctly as "the cognitive representation of the sonic environment, especially of the relationships between its constituent sound parts (sound events).' Thus, soundscapes are perceptually broader than the mere auditory representation of sounds from distinct sources present in the environment (auditory scenes). Typically, soundscape research appeals to professionals (1) with strong interest in the improvement of public sound exposure, irrespective whether they do so by enhancing positive or by mitigating negative effects, and (2) coming from widely different occupational and disciplinary backgrounds. Both these factors contribute to soundscape experts' sensitivity to social factors in addressing public sound exposure. However, social commitment should be no reason for soundscape researchers to prefer qualitative over quantitative analysis, nor to consider the exposed individual -not even temporarily so- as expert in his own soundscape. On the contrary, all scientific soundscape research "must be kept separate from educational activities, political actions and artistic presentations" (Karlsson). Scientific soundscape analysis, at any level of quantification of perception, will only benefit from sound empirical theory.

1. INTRODUCTION

Man's concern about his sonic environment seems to be weighed down by a negative start. The oldest known text, written on a Sumerian tablet of 3000 BC, is about soundscape. It tells how the peaceful life of the Mesopotamian gods had been stressed by the noise from the infrastructure works by their just created mankind digging out the Eufrates and Tigris. This noise made the upper God Enlil send terrible floods (with a drought in between) to the earth. Does the story also exemplify how much less important to man his acoustic than his visual environment is? Perhaps. When asked whether, in the hypothetical event of being forced to choose, one would rather become blind than deaf most people respond impulsively by "deaf rather than blind" (Note 1). Yet, as the hearing system is omni-directional and ever awake, it seems to be the older sense. Mechanoreceptors, like also in the tactile sense, will have been easier to construct than photoreceptors. Cue of the age of the hearing sense is the observation

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that audition of some terrestrial vertebrates like man is based on hair-bearing neuromasts similar to the ones in the lateral line system of man's ancestor, the fish: both basically detect pressure waves in fluid. Viewed in this evolutionary way, soundscapes are at least as prominent as landscapes. However, analytical interests in soundscapes is only several decades old. Geographers may have been the first to show interest when studying which sounds were when "breaking up the quietude of the senses".[1] About half a century ago soundscapes gained wider-spread attention. Murray Schafer, music composer and conductor of series of soundscape studies at Simon Frazier University in the 1960s, became the first Glenn Gould Prize laureate in 1987. A further landmark indicating the presence of a maturing field was placed in 2000 when the professional journal 'Soundscape: The journal of acoustic ecology' appeared on the market.

2. DEFINITONS.

There exist several definitions of soundscape. At first sight they seem quite different but closer inspection reveals significant commonalities. Firstly, all authors describe 'soundscape' by using perceptual categories, although in varying ways. Murray Schafer[2] writes "(t)he soundscape is any acoustic field of study"(p7), and "A soundscape consists of events *heard* not objects *seen*" (p8; emphasis MS; Note 2). The "themes of a soundscape" are "keynote sounds, signals and soundmarks" (p9). The first two are explained in terms of the Gestalt-notions of figure/ground, and 'soundmark' is defined as "a community sound which is unique"(p10). In Oliveros' definition[3] of soundscape as "(a)ll of the waveforms faithfully transmitted to our audio cortex by the ear and its mechanisms" the perceptual factor is more explicitly identified, but it will still need computational neurophysicists and social-neuroscientists to agree on what type of brain processes truly constitute faith. Truax[4] calls soundscape "(a)n environment of sound (sonic environment) with emphasis on the way it is perceived and understood by the individual, or by a society". Soundscape is shaped by both the conscious and subliminal perceptions of the listener, he argues, and the description of soundscapes must be based on perceptual frames such as foreground, background, rhythm, space and volume. Schulte-Fortkamp[5] defines soundscapes as "acoustic spaces, environments as they are characterized by their lay-out of the sounds, by the noises subjectively attended to, and by their orientations" (p.224; Note 3). Notwithstanding the different terminologies of the above definitions, they all make the categorical distinction between 'sound' to which one is exposed and processes of 'appreciating' sound (e.g., uniqueness, faithfulness, attended to, individually understood). Soundscape is not part of the domain of 'sound' but of the domain of things "created by sound" (see, e.g., www.nationmaster.com/encyclopedia/soundscape). Secondly, as shown clearly by most definitions presented above, soundscape never is about the individual sound or sound event. Rather, it is about the opposite: about the entirety of sound exposure both in terms of sum (*environment* of sound, *all* of the wave events transmitted, etc.) and/or structure (themes, *lay-outs*, etc.). If comparing soundscape analysis to auditory scene analysis[6] , one could say that the former analysis is conducted at the molecular level in contrast to the latter which is operating at the atomic level.

In the above analysis perception and structure are being viewed as core features of soundscape. Therefore, using modern psychological terminology, I define soundscape as "the cognitive representation of the sonic environment, especially of the relationships between its constituent sound parts (sound events)". Undoubtedly, there will exist different denotations of 'cognitive' within different disciplines, as each is having its own type of causal factors to look at. For example, neuropsychologists may be looking at how neuronal firing in the auditory cortex itself is modulated by higher up neuronal dependencies, e.g., at how hearing is dependent from viewing or other sensory activities. On the contrary, psycho-acousticians may define their dependent variables at the internal perceptual level in much more expressionist way (e.g.,

'soundmark') while measuring modulation by external acoustic context. Whatever determinant is taken to focus on, soundscape analysis always is about how various sounds together impact upon a representational system. To soundscape analysts the system is the human mind (Note 4).

3. SOUNDSCAPE AS SUBJECT OF SCIENCE.

The aural historian Thompson[7] describes how, for ages, a 'good sound' had to reflect the unique architectural character of the specific site in which the particular sound was heard. The acoustic signature of a place could not be written without ink of reverberations. However, by 1930s, 'good sound' became redefined increasingly as a noise free signal which meant, a.o., free of reverberations. By the steady development of more powerful technological interventions ever more sounds were identified as unnecessary and unwanted (noise). Soundscape research can be seen, at least partially, as a re-action against this mechanism and its driving but biased attitude. Soundscape researchers want to restore attention to the whole of the acoustic experience instead of to the sum of its however carefully designed parts. Or, in less philosophical but more experiential terms, they wish to redesign entire environments so to be more pleasing to the ear. In this sense, soundscape research could be characterized by positive reactivity more than pro-activity.

Soundscapes have been, and still are, attracting attention from professionals as divergent as composers, city planners, environmentalists, sonic performers, movie directors and therapists. As is the case with these creative professions in general, soundscape researchers and designers are likely to show sympathy with holistic, grass-root action more than with incremental and conservative movement. But however positive this attitude or trait as such may be, it cannot be the base for distinguishing between better and worse *scientific* soundscape activity *per se*. Rather, all scientific soundscape research "must be kept separate from educational activities, political actions and artistic presentations" [8]. Or, phrased positively, the scientific investigation of soundscapes should proceed along the same lines as any scientific study. Only by placing this restriction at the base of their efforts soundscape researchers may trust to produce practicable insights. The achievement of this goal will be frustrated by two ideas recently advocated in the soundscape field, however sympathetic to many exposed to environmental sounds they will appear. It are (1) the idea that qualitative research, at least temporarily, should be valued more than quantitative, and (2) the idea that the individual who is exposed to sound should, at times, be assigned expert status.

A. Critical quality and critical expertise.

Science is trial and error, but in a very special way. It is the act of specifying expectations (trial) in such a way that there are susceptible of empirical refutation (error). This act always has a qualitative and quantitative content, and the two cannot be separated. There exists no scientific discipline without counts. There always is the statement about when the phenomenon is expected to occur (=count 1) and when not (=count 0). Counting is essential in deciding what to consider hit, miss, or false alarm. Counting also implies abstraction, preference of the universal over the singular. It requires the act of category assignment, at least at the research phases of input and output description. Only by selective attention, whether by effortful or serendipitous thinking, there can be discoveries made. Typically, disciplines with highly advanced counting techniques are called 'hard'. By advanced quantitative means ranging widely from cohort observations to laboratory induction of behavioural preferences to brain scans (social) psychologists are increasingly conducting very hard science. Social science is subjective only in the sense of it being about human subjects, not in the sense of being less

objective. Whatever discipline a student will choose, becoming a scientist requires training in this reasoned combination of quality and quantity, and the demonstration to the scientific community of competence in handling both. By definition, a lay person is (s)he who is not capable of doing the same. (S)he may consent to the provision of personal inputs into the expert analysis, but (s)he cannot be held accountable for its output. To put it negatively, investigator and investigated must live up to different standards, however much they may agree on the value of the investigation itself.

Critical quality. It is a well established fact that the reduction of environmental noise annoyance needs addressing not only acoustic factors (e.g., SPL-levels). As much needed, if not more, is greater political sensitivity to non-acoustic factors, such as providing useful information about onset and duration of exposure, or offering exposed residents fair options to individual and collective noise control.[9,10] It seems true that, in general, there is far insufficient scientific effort spent on investigating social and emotional determinants of residential noise. The results indeed of searching into the database of the last once-in-every 10-year conference where scientists from all over the world with all possible interests in acoustics meet speak a clear language (see Table 1). Thus, there is good reason to conclude that more social scientific effort is needed.

Search term:	"feeling"	"affective"	"emotion"	"social"
Hits	1	1	8*	3

* one author with 5 hits

Table 1: Number of hits for word presence resulting from searching all 3504 abstracts submitted to the 2008 Paris ACOUSTICS conference.

However, Schulte-Fortkamp et al.'s[11] assessment of seemingly the same problem is different: "A shift from studies only dealing with noise annoyance and SPL-reduction strategies to more qualitative evaluations of the quality of soundscapes is necessary to overcome the limits of the actual, often ineffective noise policies" (p.3; Note 5). In my opinion, this belief that there should be more 'qualitative evaluation' of our acoustic environment, or the trust that only then noise policy will become more effective, goes together with some misunderstanding of the nature of scientific observations. Scientific observations derive their status from scientific theory only. Science is aimed at understanding by reducing complexities to simplicities, but with the simultaneous recognition that things should not be made simpler than they are (Einstein). Yet, the position taken by the aforementioned advocates of more qualitative soundscape research seems closer to the opposite point of view when it is concluded that "the study of environmental noise (…) is still not reducible to simple interrelations; the evaluation process in the context of environmental noise cannot be understood by eliminating its complexity, but rather by accepting its complexity." (p5). Indeed, this 'acceptance of complexity' must be questioned seriously as, in the context of scientific investigation, it predisposes to uncritical observation of how and to what end noise-exposed individuals evaluate their (social) environment the way they do.

Critical expertise. 'Grounded Theory' is proposed as means to the better understanding of human perception in the field of soundscapes[12]. 'Grounded theory' favours data-collection in real life settings in a way that "guarantees the reliability and authenticity of the data" (p499; Note 6). It is stated that the responses of study participants in real life settings are more likely to be "free and spontaneous", which type of responses are believed to be also the most informative responses for behaviour when it is dependent upon more than one causal factor.

The “communicative validity” of the collected data is established by discussing with the respondent his spontaneously expressed (evaluative) judgments as well as other topics of interest to the study (Note 7). The authors do not fear that respondents are prone to behave strategically with respect to the outcome of the study, neither to the person nor the institution conducting the study. The “new subject centred method” will not make respondents hide from their real motives and values. Not only are respondents - and investigators alike - willing to disclose their “specific (but not artificially forced) emotions and feelings”, but they are also capable in doing so. In this respect, they both can be assigned expert status. Indeed, “(…) not only the acoustician is having expert knowledge about the perception of product noises but all consumers do whose knowledge relevant to product assessment stems from their ordinary life experiences with the particular product” (p450; Note 8). Only by the exchange of expert knowledge (‘Expertenwechsel’) can sound environments in real life (‘Geräuschgestalten’) be described effectively and efficiently. After all, discursive communication between investigator and investigated is the means for both to the same end: better sound exposure. Apparently, laboratory insights irrespective of their nature (social psychological or technical) are not considered to have much real-life value.

B. Needed: Sound theory.

Soundscapes, being essentially a psychological phenomenon, need to be studied more than it occurs at present by acousticians and non-acousticians together. The quality of nowadays environments may benefit especially much from interdisciplinary research, that is, from joint scientific theory and measurements. However, such cooperation will be frustrated if soundscape researchers, in the effort to become “(…) resistant against criticism from strict advocates of quantitative research” [12], come to think that they should emphasize qualitative criteria of their own work at the expense of quantitative criteria, and if they believe that investigator and investigated contribute to better understanding in the same way because there is no fundamental difference in expertise. These propositions are naïve and non-scientific.

No science can advance on one leg. Quality implies counting just as counting presupposes the making of theoretical distinctions, that is, reasoned selective attention. ‘Saturation’ (that is, the development of as many categories as needed to account for *all* responses collected, as advocated by ‘Grounded Theory’) is a negative rather than a positive criterion for model building. Other than suggested [13], the placing of “(…) subjective experiences and judgments into focus of research” (p500) does not require in any way to distance oneself from “statistical means and pre-defined response categories” (Note 9). At whatever behavioral level responses will be predefined, it always provides (less or more clear) information on the investigators ideas-in-advance-of-measurement about which responses are likely to occur, and which are not. And it is this very theory only, whether weak or strong, which is needed to advance knowledge about soundscapes and its determinants. The belief that this need is similar to the need for more qualitative as opposed to quantitative research is merely reinforcing the caricature of social sciences as ‘soft’ and natural sciences as ‘hard’. It will make it unnecessarily difficult for socially oriented acousticians and technically oriented non-acousticians to cooperate in understanding how we perceive (changes of) exposure to the sonic environment.

As a consequence of this misapprehension of the role of quantification in social science, it seems, there also is a misunderstanding of the relationship between respondent and investigator. This relationship is fundamentally asymmetric, with the investigator being the professional to deliver her/his improved insights into the problem as result of empirical analysis. Not only the transparency of these insights is based upon this very asymmetry. Also, for those insights to become politically useful to the noise-exposed individual or group, the latter wants

the very label ‘scientific’. Calling both the investigator and the investigated ‘expert’ is blurring the distinction at the cost of the transparency and strength of the outcomes of the investigation. Individual behavior is strongly determined by all sorts of in- and outgroup dependent needs and wants, but introspection is a notoriously weak method to become aware of these influences, with iterative communication to deepen insights into those influences being a not much stronger method.

4. CONCLUSION

In conclusion, whereas soundscapes are very old, the scientific exploration of soundscapes is very young. The latter, being the analyses of the cognitive representation of sonic environments, requires the joint effort of acousticians and non acousticians (and especially cognitive and social psychologists). This interdisciplinary work is certain to lead to sound results if the efforts of acousticians and non acousticians alike are firmly rooted in the general discipline of science.

NOTES

1. One cause of this preference for deafness may be the stronger association of visual percepts with willful act than of auditory percepts. Furthermore, we all are much more often physically confronted with negative behavioral effects of blindness than with negative behavioral effects of deafness. Besides, most people do not stick to this initial preference after some more thinking.
2. Nowhere in his text Schafer (1977) himself provides a definition. In his glossary soundscape is described briefly as “The sonic environment.” (p.247).
3. Soundscapes are “akustische Räume, Umgebungen, die durch die Anordnung des Schalls, die subjektive Fokussierung auf Geräusche und die Orientierungen definiert sind.“
4. In principle, soundscape research could apply to non-human representational systems as well. Think of sonar impacts on orientations of see mammals, etc.
5. It should be noted that the author draws a less unbalanced conclusion at the end of the article where she “points out the importance of using a qualitative approach in the survey, as heuristics to further quantitative measurement techniques”.
6. "Die Datenerhebung findet in dem realistischen Umfeld (…) statt und stellt somit die Reliabilität und die Authentizität der Daten sicher. Dazu werder die Versuchspersonen (…) ermütigt frei und spontan Eindrücke (…) zu äußern. Die Offenheit des Verfahrens gewährleistet die Exploration relevanter (…) Interdependenzen die nicht monokausal den untersuchten Stimulus zuzuordnen sind.”
7. “Durch das Besprechen der spontanen Kommentare unde das Vertiefen versuchsrelevanter Themen entsteht die kommunkatieve Validierung der erhobene Daten.“
8. “(…) da nicht nur der Akustiker Experte in der Wahrnehmung von Produktgeräuschen ist sondern alle Konsumenten, die aufgrund ihrer alltäglichen Erfahrungen mit einem entsprechenden Produkt evaluationsrelevantes Wissen besitzen.”
9. “Die Neuorientierung verlangt, dass der Einzelne mit seinen subjektiven Empfindungen und Beurteilungen im Fokus der Untersuchung steht und nicht (…) in statistischen Mitteln und vordefinierten Antwortkategorien untergeht.”

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