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EXPLORING THE IMPACT OF SOUNDSCAPES ON NOISE ANNOYANCE

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ABSTRACT

The evaluation procedure to detect and to analyze soundscapes in their meaning regarding noise annoyance measurement is a new step and a very complex procedure. Focusing on the interaction of people and noise different aspects like the structure of urban areas, people living in those areas, architectural and social parameters designing those areas, and acoustical and visual parameters will be taken into account for analyses. Moreover socio-cultural and lifestyle related elements of soundscapes will be discussed concerning the aspects of annoyance measurement which usually are focused on interference, disturbance, sources of annoyance, and predicting noise annoyance. Basically, in the discussion of both procedures it is questioned whether Soundscapes can work as a moderator concerning annoyance.

1 - INTRODUCTION

Looking back to the last 30 years in annoyance measurements detects the differences in concepts and operationalization concerning noise annoyance surveys especially regarding whether emotional effects and disturbances have been taken into account when measuring noise annoyance [1]. Soundscapes will be discussed here to elaborate the relationship between the burden of noise and noise annoyance. Focused is the interaction between life situations and noise sources. Mainly questioned is whether Soundscapes can work as a moderator concerning noise annoyance. Additionally, there is a need to establish the meaning of "soundscapes" in such a discussion about moderators. Probably the meaning of *soundscapes* in its original coherence will not satisfy the intention to moderate annoyance [2,3,4,5].

2 - SOUNDSCAPES

When carrying out the *World Soundscape Project* in the 70th Murray Schafer and his colleagues concentrated on the interaction of people and sound, the way people are consciously perceiving their environment. Following this attempt the idea was raised to modify soundscapes adjusting to the living areas, to take into account different aspects like the structure of urban areas, people living in those areas, architectural and social parameters designing those areas, and acoustical and visual parameters. Very often the gestalt or the construction of public places was under consideration and the soundscapes, the acoustical scheme, was stored by recordings to keep the soundscapes available for the future to understand their underlying structure.

One of the most prominent research is 1977 Schafer's *Tuning of the world* [6] which was translated to German in 1988. In 1993 in Japan the Soundscape Association of Japan (SAJ) was founded, and Schafer's *Tuning of the World* was translated into Japanese. Also in 1993 in Germany the "Forum für Klanglandschaften" (forum of soundscapes) was built related to an international network "The World Forum for Acoustical Ecology", Vancouver B.C. based on research activities in the 70ies. Schafer's cultural history of hearing is a story about people's habit with natural and self produced sounds. His questions of acoustical ecology gave a systematic to the discussion on the sounding environment, the approach was avant-garde, the results rich of facets, raising always new ideas [7]. "Acoustic and psychoacoustics will teach us about the physical properties of a sound and the way the sound will be processed by the brain. In the society we can study how the human being will behave against sounds and how the sounds will

influence the behavior. The arts, especially the music will teach us that the human being produces sound spheres to live in the fantasy and the psychic reality”.

3 - ANNOYANCE

Basically, research on noise annoyance is evaluating the reaction to noise, the effects of disturbances, interferences of activities, restricted communication, social interaction, sleep disturbance, as well as detecting the physical parameters characterizing the noise.

The definition and measurement of noise annoyance varies concerning the different studies. In some studies annoyance is defined by an explicit judgment of the interviewees, in some others it is more or less a summation of reported disturbances about activities. In the same way the measurement procedures differ concerning interviews covering the judgment of the overall environment up to the use of different scaling procedures like verbal scaling, magnitude estimation, categorical judgments etc [1]. Presently a recommendation on two noise annoyance questions for nine languages is under development relying on the results of a noise-annoyance modifier study [8]. Not the objective content but the subjective interpretation will determine the reaction of people to their environment. The aim is to separate the physical characteristics from the psychological criteria concerning the reaction to the environmental conditions [9].

Concerning the evaluation of noise events field- and laboratory studies on noise in residential areas have shown that the meaning of the noise, its informative character is relevant when acoustical events are judged. There are results from tight descriptions of noise events which strongly point out that in a real living situation acoustical-ecological, psycho acoustical as well as socio acoustical factors became evident to be investigated [10].

4 - SOUNDSCAPES AND ANNOYANCE

If the definition of soundscapes proposes a specific gestalt of a sounding environment, which is harmonic, the situation will become disharmonic by noises or sounds not fitting to the environment. This may happen, when suddenly noises appear which usually are not typical for such a residential area. But, when the permanent increasing of passing by cars in residential areas will be reduced by rebuilding of the area the soundscape will change, will have a new character. And this kind of change will be accepted by the residents (Klaboe). Researches concerning the moderator effect of the quality of the residential area regarding annoyance give hints that they may work like a noise exposition equivalent of 5 dBA [Lercher]. Evidently, annoyance research has to take into account different parameters and can not focus only on one parameter: while Klaboe is discussing from an architectural point of view with regard to changes which influence the noise development as well as odor and dust, Lercher asks for the natural environment like parks and gardens which may moderate the annoyance, but his special point of view is here that the local traffic is topped by the highway and railroad traffic. Even more difficulties arise when noises from different sources are to be judged. Analyses of such a constellation of noise events like road, rail road, and air traffic show something like a spectrum of subjective perception, reaction, and judgment. Although there are various surveys to solve this problem of measurement, there are no models and measurements up to now, which definitively define the procedure [11,12].

5 - DISCUSSION

Results of a study in the area of Kingford Smith Airport, Sydney suggests ”that the background factors which influence reaction to noise may be reasonably limited to the soundscape. Nonetheless, further research is required to establish whether other features of the enviroscape and psychscape are relevant to noise reaction” [2, Job]. And Lercher et al [3] found ”noise sources interact with the specific acoustic and environmental makeup (topography, meteorology, land use pattern, and lifestyle). The higher dissatisfaction expressed with their environment – in spite of overall satisfaction with personal life quality points to difficulties to control the noise adequately.” Maffiolo et al [5] point out ”in field studies, the main results establish that garden soundscape evaluations integrate subjective evaluation of the landscape visual contributions: a positive evaluation of the landscape reduces annoyance of the soundscapes whereas a negative evaluation of the landscape increases annoyance.”

Taking into account such results opens the discussion concerning the moderator *soundscapes*. In a study carried out by Fyhri and Klaboe et al [13] the problem was highlighted ”in defining a subjective sound- or urban scape that is dependent on which parts people relate to and how they relate to them. The Sunday walker will clearly have a different experience of a street than a Monday morning late-for-work bus chaser. Further studies must therefore more actively explore different people’s actual use of their immediate and more distal part of the soundscape.”

To decide about the meaning of soundscapes procedures are needed to explain the effects of soundscapes concerning their function. In the same way as music soundscapes are functioning subjectively and individually. Natural environments are soundscapes to recreate and to relax but of course a loud, funny atmosphere may have the same effects in a special situation. The function of soundscapes is defined in its effects on man and vice versa. Basically, an acoustical ecology will serve to understand the function of soundscapes and may build so far the basis not only an aesthetical but a functional acoustic design. Perception will not be reducible on effects of the so called objective parameters of an environment, moreover it will be influenced by personal and contextual factors, which is also true for the moderator soundscape.

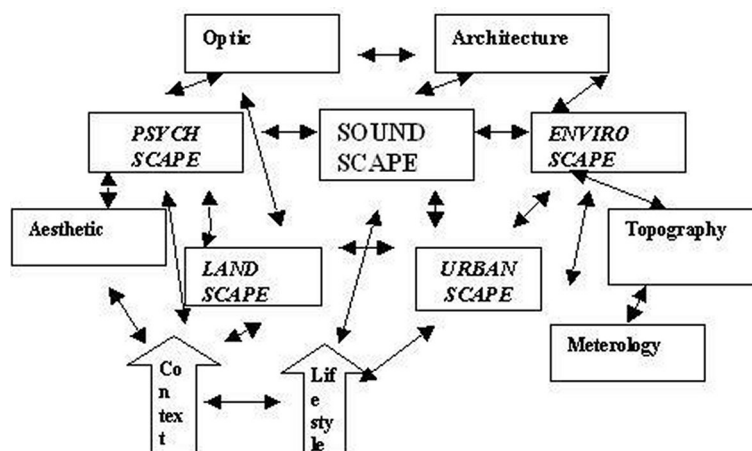


Figure 1: Factors relevant for the definition of soundscapes.

6 - SUMMARY

The question was whether soundscapes can work as a moderator concerning noise annoyance. As shown by the different investigations concerning soundscapes a definition of the meaning of soundscapes is necessary. Evidently, the moderating effect of a given environment and its soundscape has to be discussed on three levels: 1. the extension of factors that describe annoyance, 2. the peculiar feature of burdensome noise contexts, and 3. the discrepancies of the social status of people living in areas where the rebuilding will change the quality of the area. These different aspects concerning the moderators which play a role may lead to the question whether a factor *soundscape* integrated in the discussion of overall annoyance will help to fill the gaps towards the uncertainty whether residents react more annoyed on road-, rail-, and air traffic noise as in earlier times, which correlation exists between annoyance judgments and somatic processes, and what happens when people give an overall judgment on the degree of annoyance. Future research work is needed to explore soundscapes moderating the judgment on life situation and noise sources.

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