Sonic tools for landscape architecture

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Abstract

There is a need for new sonic tools in practical spatial planning and landscape design for acoustic considerations, beside issues of noise abatement. The practise of planning and design is visual oriented and lacks concepts, models and reference objects dealing with other sensory impressions than the visual. A CD-ROM prototype containing acoustic recordings from two landscape settings has been developed. The prototype should be further developed into an audio-visual and interactive tool for practitioners in landscape architecture. Preliminary descriptions of the acoustic contents are based on Schafer's terminology.

1 Introduction

The famous landscape architect Ian McHarg (1969) described the process of landscape architecture partly as the synthesising of layers of information. His over-lay techniques help in weighting together interests in the landscapes. One of the layers was the information of sounds in the landscape in terms of *noise*. We here introduce a layer that describes sounds as a resource (*e.g.* Schafer, 1977), which reflects site-specific soundscape information: *the sonotope layer* (Hedfors & Berg, 2003).

We believe there is a need for new *sonic tools* in practical spatial planning and landscape design for acoustic considerations, beside issues of noise abatement. The practise of planning and design is visual oriented and lacks concepts, models and reference objects dealing with other sensory impressions than the visual.

To introduce sounds as a *resource in planning* and an *element of design* we developed an interactive tool. An audio-visual CD-ROM prototype was tested and preliminarily evaluated. The question was whether practitioners in landscape architecture and planning find the application of the kind of tool useful in their profession. The present study is part of a planned PhD-thesis having the preliminary title: *"Site Soundscapes - Landscape architecture in the light of sound"*.

2 Objective

The objective was weather interactive explorations executed by the practitioners themselves help them to point out sounds as a resource. The explorations were intended to develop the users' aural awareness and ability for auditory conceptualisation - *ear cleaning* according to Schafer (1977, p. 208). Do practitioners attach value to these aspects? Do they find the aspects oppressive, as they might find their work as already full of complex problem solving? Or would they be curious and excited to develop and reach even higher sophistication in their projects by requesting tools like the one presented?

The particular question of interest was weather the acoustic sequences performed on the CD-ROM were suitable and fulfilled their purpose. What should sound clips contain to attract practitioners in landscape architecture and planning? How could these short acoustic images as a professional sketch/planning tool generate and deepen their personal knowledge and support them to take sonotopes into account in their practical projects?

3 Method

Our site selection procedure for case studies on reference objects was discussed in Hedfors & Grahn (1998) and Hedfors & Berg (2002). The rigorous strategy of selection pointed out an ancient *pasture landscape* on a city fringe (Case I) and a famous *public city garden* (Case II). Both sites were popular but carried opposite qualities. A computer-based audio-visual tool (CD-ROM) was developed based on the cases and interviews carried out on these sites with selected individuals considered as skilled listeners (Hedfors & Berg, 2002; 2003).

The audio-visual tool consisted of three parts of listening exploration: *site-specifics, comparisons,* and *experiments*. A questionnaire was included focusing on the over-all question whether the practitioners found the tool useful in their profession. The user could choose the order of exploration - an interactive element of the tool. One option was to listen to the *site-specific* recordings of the two landscape settings mentioned above. Another option was to *compare* some recordings from the same sites, both what matters site-specific qualities and seasons of the year. A third option was a demonstration of authentic *experiments* with sonic features and their proportions to surrounding sounds on the same sites.

The purpose of the third option, *the experiments*, was to explore acoustic change and influence on expected activities or land use *on respective site*. The experiment in Case I, demonstrated a recreational site and traffic murmur at three distances. The user of the tool estimates differences between authentic soundscapes that held sounds of the same road, but of various prominences. The acoustic sequences were recorded in the *real* landscape. Hence, validation what matters authenticity was not needed as if simulations would have been used. To catch the acoustic images we made recordings at different distances from the road. A weakness of the method was our moving of the microphones into different sites in the landscape between the recordings, while the landscape colours the auditory scene differently. Thus, we tried to record at positions with similar layout.

The experiment in Case II demonstrated some different fountains and their water sound qualities on site. The user might study authentic proportions between existing soundscapes and these additional sounds of water jets. The acoustic sequences were recorded in front of a real garden pond and a real fountain that we installed with various jets. Again, validation what matters authenticity was not needed as if simulations would have been used. A weakness of the method was the change of time elapsing between recordings, while the surroundings are ever-changing. Thus, we tried to record at times with similar keynotes (Schafer, 1977).

3.1 Selection of acoustic sequences and concepts

The samples were authentic recordings carried out with low quality binaural microphones placed in the author's ears. Some of the sequences are briefly described in Tab. 1. The descriptions are based on Schafers (1977) terminology *keynotes* (i.a. Truax, 1978, p. 68) and *sonic features*. Usually, *(sound) signal* is the term for a sonic feature (Truax, 1978, p. 127), which suggests both an intentionally sent and an intentionally received message. Our use of the concept of sonic feature suggests a neutral perspective to such intentions and overlooks whether a certain individual is the intended receiver of a message or not.

The array of concepts in this study are related to the visual theory of figure-ground (e.g. Schafer, 1977, p. 151) and organised into a descriptive *model of prominence* generating the dimensions of *intensity* and *clarity*. It also suggests the soundscape properties *mild/powerful* and *clear/crowded* (Hedfors & Berg, 2003). These dimensions and terms were drawn from disciplines like music and acoustics that offers a rich array of concepts. The model is suggested as a starting point and an effective approach for the practical planning and design professions (Hedfors & Berg, 2003).

4 Results

The results of interviews on site, together with skilled listeners (Hedfors & Berg 2002) presented by Hedfors & Berg (2003), were organised and presented on a CD-ROM. The CD-ROM was intended as a prototype of an interactive tool. The contents and design of the tool were briefly described as the result of this study. The acoustic sequences were obviously a critical component of the contents and a few images are described in Tab. 1. The tool had some initial open questions offering free phenomenological descriptions for the user. In a second step inspiring (or limiting) words were accessible. They were characterisations for sonic environments grouped into *words of onomatopoeia* (like for instance the *rushing* sound of water), *technical words* (like for instance *a complex pattern of acoustic frequencies spectra* of rushing water) or *words evaluating atmospheres* (like for instance *the calming and surprising* rush of water).

The selection of sound images, that were meant to represent the sites, was as already mentioned based on Schafer's model of *signals and keynotes*. Samples that illustrate recurrent characters (signals) are called sonic features and were used to represent the respective site (titled: *site-specifics*). Comparable samples between sites *(comparisons)* held keynotes only, and were lacking in recurrent characters (not exemplified in Tab. 1). The experimental part held acoustic sequences focusing special planning and design problems *(experiments)*.

5 Discussion

The tool development started out with an assumption that practitioners are able to draw naturalistic generalisations (Stake, 1995, p. 85) out of our reference objects to their projects of current interest. We parallel Alexander's et al. (1977) approach and contribute with aural conceptualisation patterns to their language of patterns of towns, buildings and construction. They introduce their pattern language:

> "The elements of this language are entities called patterns. Each pattern describe a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice"
>
> (Alexander et al., 1977, p. x).

Let us exemplify an exercise for aural conceptualisation by studying the CD-ROM experiment with the different fountains in the public city garden (se Tab. 1. Samples: *Foaming jet and Water bell jet*). Like Alexander et al. we describe a problem, which occurs over and over again in our environment: a diffuse sonic identity and insufficiency of aural foci in city parks. The core of

the solution to the problem is to add a sonic element, like a fountain. This solution can be used countless times over in ever-new ways. The fountains exemplified on the CD-ROM use the same amount of water but sounds differently. Thus, the sonic relations and proportions between the water features and the ambience change as well.

As the practitioners use the tool, their expressed generalisations will be based on their focused

Tab. 1 Preliminary descriptions of some of the sequenses on the CD-ROM.

Site-specific recordings

Case I - Pasture		***Case II - City garden***	
Sample: Sequence 1.		*Sample: Sequence C.*	
Keynote • Continuous mild twittering of songbirds (in a spherical field of auditory space) • Continuous weak traffic murmur modulating at a distance (in a spherical segment of auditory space) • Long sequences of careful whines of wind (in the listeners external ears and in surrounding vegetation)	Sonic features • Chatting of relaxed female voices passing by • An occasional soft human whistling • A single sudden bang of a wooden gate • A few rhythmical calls of a woodpecker • Some steps on the ground forming a rhythm	Keynote • Continuous, mild and low frequent ambient urban sound • Continuously calling of flocks of jackdaws • Continuously growing and decreasing murmur of an airplane mixed together with ambient urban sound	Sonic features • Circulating flock of jackdaws that becomes prominent • Sounds of detached vehicles fading in/out • A few high pitched shrieking vehicle breaks • Some steps on fine gravel paths forming a rhythm
Sample: Sequence 2.		*Sample: Sequence E.*	
Keynote • Constant intensive and relatively strong twittering of several bird species • Sequences of several child voices playing at a distance	Sonic features • Distant rhythmic barking of a dog reverberating in the relatively open landscape • Some twittering of songbirds that becomes prominent	Keynote • Continuous, mild and low frequent ambient urban sound • Continuous mild babbling of a small water jet	Sonic feature • Powerful and overwhelming sirens of an emergency services vehicle • Some steps on fine gravel paths forming a rhythm • Sounds of detached vehicles fading in/out
Sample: Sequence 7.		*Sample: Sequence F.*	
Keynote • Incessant pulses of broadband rain murmur • Some child voices playing at a distance	Sonic feature • Sounds of detached vehicles passing by – both from accelerating motors and from wet tires on asphalt	Keynote • Continuous rumbling of low frequent ambient urban sound • Continuous mild babbling of a small water jet	Sonic feature • The echoing between building walls of carpet beating • Sounds of detached vehicles fading in/out • Some steps on fine gravel paths forming a rhythm

Experiments

Road close to the pasture (Case I)			
Sample: Actual distance from road		*Sample: Quarter distance from road*	
Keynote • Modulating murmur of wind in the ears • Mild modulating murmurs of traffic at a distance • Mild croaking of birds • Some child voices playing at a distance	Sonic features are lacking	Keynote • Modulating heavy low pitched rumble of traffic	Sonic features • Single vehicles gets prominent fading in/out
Fountains in the city garden (Case II)			
Sample: Foaming jet		*Sample: Water bell jet*	
Keynote • Continuous, mild and low frequent ambient urban sound • Occasional twitter of birds	Sonic feature • A close continuous modulated rustling sound of water	Keynote • Continuous, mild and low frequent ambient urban sound • Occasional twitter of birds	Sonic feature • A close continuous pulse of a gentle sprinkling sound of water

listening and their auditory conceptualisations. The pedagogics of the tool should be discussed. However, the topic here is the acoustic contents of the CD-ROM. The result descriptions above include onomatopoetic, technical, and appraisal terms. Duration, rhythm, level, pitch, distance and source are some dimensions used. Are these types of descriptions suitable to planning and design? Would phonetics be needed to get a higher precision in the description of sounds (descriptions that are free-standing from the sources of sounds)? Are there other dimensions, like for instance sound propagation, that are important?

The method of description should be further developed and focus on different approaches typical to landscape architecture and planning like *land use, space requirements, or functions* and *landscape, building* and *garden material qualities* (including vegetation). Practitioners in projects of road layout are assumed to have use of the Case I *experiment*; not the least in projects close to "sensitive" land uses as sites for recreation. These kinds of projects often involve environmental impact assessments (EIA) including noise abatement. The Case II *experiment* was intended to work out as a catalyst for a progressive sonic design of public city gardens and parks. We presume that gardens like Case II need an interior sonic identity produced by auditory foci like fountains that can compete with dominating surroundings.

Further discussions on sounds in the landscape should start out from how to *represent* landscape sonic phenomena. What kind of clips or sequences should be used to give over-all ideas of the sonic situation at a site? What sound signals or sonic features must be taken under consideration in planning, design and management both to render a site properly and for long-term changes of physical environments? Are Case I and II useful or what other cases are needed to work as operative reference objects? Other experiments could for instance deal with the choice of ground covers, plant species (vegetation) or bell arrangements. Additional water arrangements would probably be useful while there are endless nuances' concerning water sounds. It would also be useful to demonstrate sequences that include the listener in motion (Tixier, 2001).

The CD-ROM as a tool is intended to help practitioners define sonic values and develop their language concerning auditory aspects. They will be able to create conditions for *auditory refuges* in the cities as well as in the countryside that have contrasting site qualities to a surrounding *acoustic matrix*. Dwellers should have opportunities to choose between refuges in their neighbourhood having different auditory conditions, and it is of vital importance that the refuges they visit are close to their work and home (see a parallel in “accessible green” in Alexander et al., 1977, p. 307).

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