Validation of the psychoacoustic infrastructure of a public space in Berlin, based on the concept of soundscape

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Introduction

In September 2009, the inauguration of a public place, the "Nauener Platz", occurred in Berlin, Germany [1, 2]. This place is located in a socially disadvantaged part of the city, with a strong migration background and criminality issues. Moreover, the age distribution of the population is very wide as it goes along from little children in kindergarten and teenagers to retired people. In order to make the place appealing to everyone, various aspects of the environment have been taken into account: security, aesthetics, need for activities and of course acoustics. The acoustical study was based on the soundscape concept but using both traditional methods, such as measurements, and innovative methods: interviews, soundwalk and questionings of primarily involved people. These people are considered as local experts, as they live here and know how the place lives. Since the use of this concept on a real urban project was a world first, it was decided to evaluate the infrastructure almost a year after the opening, with the exact same methods than the one used for the planning. In this paper, the results obtained will be presented.

Global impression: a success

According to the various actors, the major goals of the redevelopment have been reached and interviews showed that the new arrangement is well accepted.

Picture 1: place map, with soundwalk way and stop points.

New kind of users

As already mentioned, there were some security issues on the Nauener Platz and families were not the main group of users. In order to prevent any possibility of hiding, bushes have been dug out, a light system has been installed for the night and no installations, like noise-abatement-wall, were to be higher than 1m50. Being totally brand new, it gives the place a feeling of security, which attracts families. There are also new "customers" of the place. Kids can play on the new playground; it is seen as a green zone in this dense residential area. From the morning with Kindergarten classes to the evening with youngsters playing football or in the summer families having barbecue, there is constantly some activities going on. It is now a place for leisure and/or family time, with fewer risks. Even if they are not numerous, some seniors come with their grand children on Sundays. Normally this phenomenon should emphasize itself, by word of mouth from parents as a great place to come after school or after retired people get used to this new arrangement and population, and find their own habits on the place.

A variety of sound atmospheres

Observing the measurement results, there are no major differences with the sound level before the redevelopment.

Table 1: SPL before and after the project

Measurement	L_{pA} dB(A) – 2007	L_{pA} dB(A) – 2010
Crossroad	66	68
Terrace	65	65

The dominant noise source was and remains the road traffic. No classical measures against this kind of noise (speed limitation, new road surface, high noise-abatement-walls…) have been implemented, or planned to be so. Thus, the sound background remains the same. But areas with different ambiences were created, by accentuating some sound components of the environment, in order to encourage one activity or another. In fact, the local soundscape was turned into a Hi-Fi Soundscape [3], thanks to the audio-islands created by ear-benches where shingle beach or birdsongs can be turned on, a sound curtain and of course the human sounds: child laughter, playing sounds, discussions…

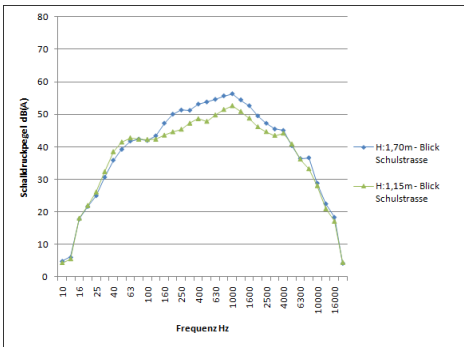
The purpose is to mask the background sound with pleasant sounds. This principle is called "informational masking". It uses the fact, that human ear cannot precisely distinguish simultaneous different sources, especially if the attention is put on a particular one. The in-depth study of the acceptance and the necessary improvement of these islands is the subject of another paper [4].

A possible zoning, with regards to sound atmospheres, could be: 1) the playground for little kids separated from the street by the noise abatement wall and the ear-benches, 2) the alley with the sound curtain, which seems to calm down even the most excited youngsters, 3) the football field, 4) the lawn and the exercise line along it, and finally 5) the rose garden. The latter, distant from the street, is the quietest area, with real natural sounds (birds, bees, wind in the trees).

User-oriented solutions

As already mentioned, security reasons impose a height limit for the gabion wall of 1m50. But still, the higher is normally the better. Initially, the efficiency of a low noise-abatement-wall on the side of the playground had been simulated. Assuming that children playing there are not taller than

1m15 and parents will be seating, while watching their kids, the required wall is 1m50 indeed, the authorized maximum. During this study, some measurements have been done to assess the real impact of the wall. As expected, while no noise reduction occurs for standing adults, it is significant for seating adults and kids, as shown on the following graph.

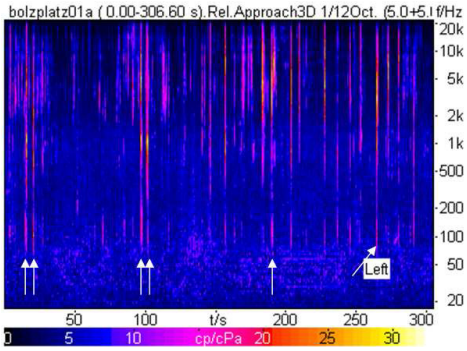


Picture 2: SPL in dB(A) under the wall, blue standing adult, green seating adult.

The largest difference, up to 6 dB, is in the frequency range from 200 Hz to 1 kHz, i.e. car rolling noise. During the soundwalks, this location (point 2 on picture 1) was evaluated as the most pleasant one on the front side of the place. This diminution allows hearing other sounds; the mind is distracted from road traffic noise.

A remaining issue: the football area

The tensions between generations are now condensed on the football place. Indeed, the seniors find it too loud and too disturbing, whatever the moment of the day. In order to prevent the ball from going on the road, the field is surrounded by a metallic fence, which vibrates every time it is hit by a ball. Moreover the youngsters have two different behaviors: groups who are really playing and groups who are just shooting the ball as hard as possible against the wire mesh to test their strength. While the first ones are well accepted, even if they are loud, the seniors are strongly annoyed by the second ones, because they cannot understand the reason of this noise. Acoustically, the characteristics of the signal are a strong repetition and a large part in high frequencies that are not masked by the traffic noise. Furthermore, each impulse reaches maximal values for psycho-acoustical parameters like loudness, sharpness and roughness.



Picture 3: Relative Approach of the shooting behaviour (white arrows)

Graphs look the same for the playing groups, but with lower maximal values. Possible improvements could be to accept only foam ball instead of leather ball, to force the teenagers to respect the quiet times or to install a non metallic fence, in order to lower the frequency.

Conclusion

The purpose of the original project was to make this place the "living room" for the residents. In order to do so, it had to become more pleasant and comfortable. It was the perfect occasion to apply the soundscape concept.

More and more, people are coming, especially in the summer. Slowly everyone finds his new marks and gets used to the new place. The various areas, with the sounds are well accepted.

As it was an experimental project, there is room for improvement, for instance concerning the sport area. All the necessary changes do not always imply new costs.

Finally, it would be interesting to see how it develops by itself in the future, how people will be taking care of it, as it is their place first, announcing a long series of others.

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