

Urban soundscape preferences in relation to the function of a place: case studies in Warsaw

Abstract

The survey interviewed three hundred and nine people in five public places within Warsaw. The aim of the survey was to examine if people's sound preferences are related to a place's function and how these preferences differentiate. A further aim of this research was to gather users' ideas for making city soundscapes more pleasant. The results showed that people generally prefer natural and human sounds, but do not like mechanical sounds; the importance of specific sounds are differentiated in relation to the function and history of a place. The main way to make urban places sound better and more appropriate to their function is to eliminate or reduce mechanical sounds (especially traffic), but individual methods depend on local conditions. The second way to make places sound better is to increase natural sounds and to make soundscapes more appropriate to their function – an increase in human sounds (mainly music).

Keywords

Soundscape • sound perception • urban landscape • Warsaw • acoustic environment • urban sound planning

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Introduction

Urban soundscapes are one of the major fields of study related to acoustic ecology. There is more and more research being done about them concerning a range of issues (recent examples: Aumond et al. 2017; Sundarsono et al. 2017; Filipan et al. 2017; Hong & Jeon 2017; Bahali & Tamer-Bayazit 2017; Song et al. 2018; Hao et al. 2016). Moreover, soundscape design is no longer just an academic postulate, it has been mentioned by the EEA (European Environment Agency 2014) and the International Organization of Standardization (ISO 12913-1:2014 *Acoustics—Soundscape—Part 1: Definition and Conceptual Framework* 2014). It is a promising way to change the point of view on noise, especially in cities. However, it is an important challenge, because actually there is no consistent approach among soundscape researchers. Finding the principles concerning how to design urban soundscapes becomes crucial.

Today we know that people prefer natural sounds and most human sounds, and they do not like mechanical sounds (Guastavino 2006; Liu et al. 2017; Ismail 2014; Nilsson 2007; Hong & Jeon 2015; Romanowska 2014; Jennings & Cain 2016). Delving into the details we find that soundscape preferences are strongly affected by the urban context and listener characteristics. The most unclear issue emerges while searching for the principles of human sound preferences (Guastavino 2006; Axelsson et al. 2010; Hong & Jeon 2015; Meng & Kang 2015).

There are many possible factors that influence sound perception. Pérez-Martínez et al. (2018) hypothesized that soundscape quality depends on the subjective assessment of dominant sounds. Axelsson et al. (2010) modelled the human perception of soundscapes by using a graph with two axes: pleasantness and eventfulness. Many researches confirm that soundscapes have

to be evaluated within their context, because activity, motivation for visiting, expectations, demographics, time, and place, affect human perception (Jennings & Cain 2016; Liu et al. 2017; Bruce & Davies 2014). According to Raimbault and Dubois (2005) the function of a place seems to be an appropriate term for linking some of these observed relationships. Romanowska (2014) investigated whether people modified their expectations according to the function of a place. The author's aim is to continue the research and to learn if people asked *in situ* in selected places in the city have different preferences in relation to the place's function.

Methodology and data collection

Study area and selection criteria

This study was performed in Warsaw because of its metropolitan character. Five places with the following dominant functions were chosen in which to conduct the surveys (Fig. 1): Nowy Świat street (tourist function), Warsaw Old Town (tourist), Świętokrzyska street (city centre), Przy Bażantarni Park (recreational), and the Lasek Brzozowy neighbourhood (residential). These places are located in two of Warsaw's districts: Śródmieście (downtown) and Ursynów (residential area).

The surveys were conducted in winter and autumn in order to examine people's impressions when surrounding sounds are rather less preferred: there are few bird and human sounds, while mechanical sounds dominate. People were interviewed on days when there was no snow cover nor precipitation that could influence their responses.

Lasek Brzozowy is a residential area in the district of Ursynów. Pilot surveys were conducted here, so only 20 people

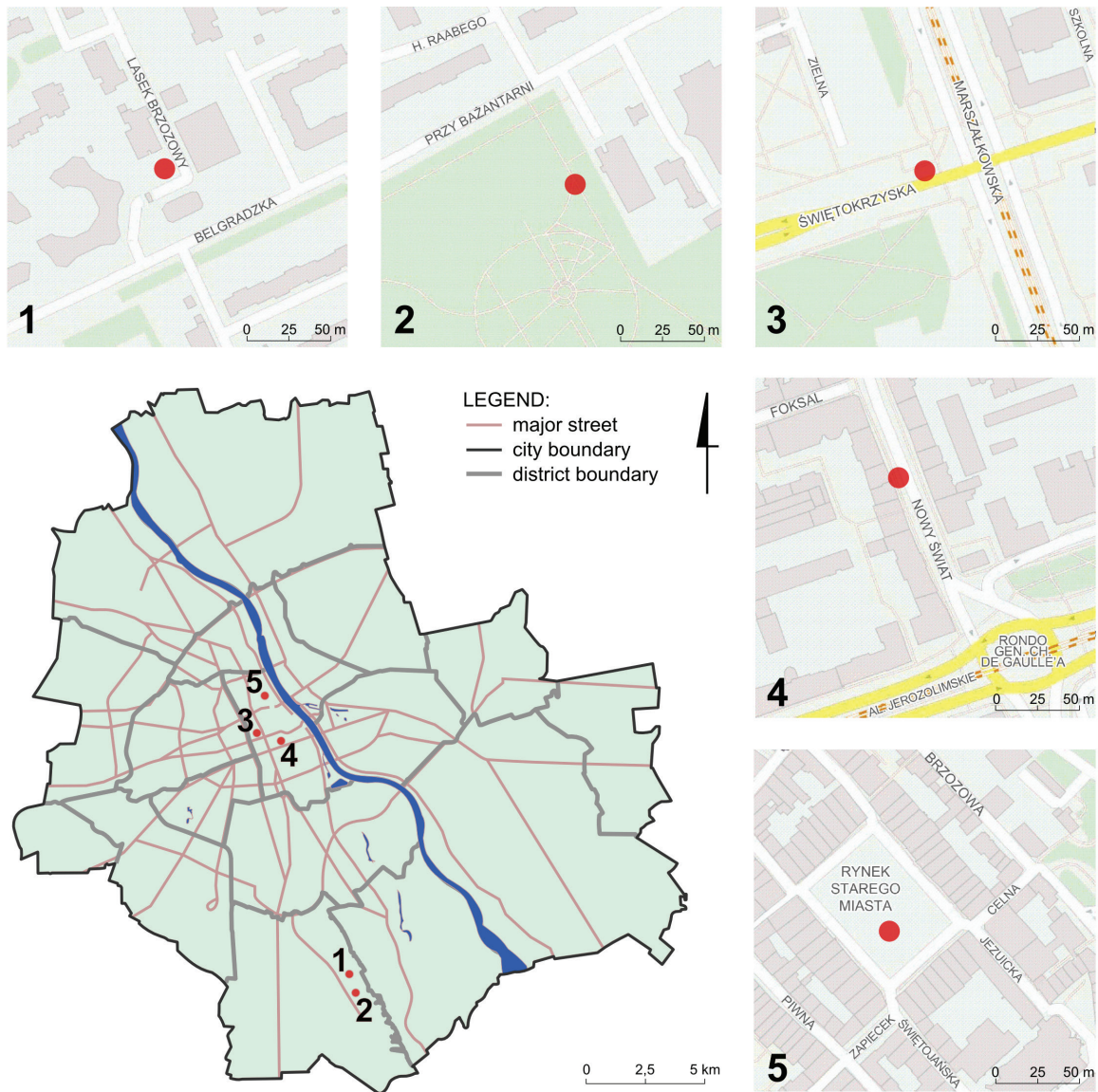


Figure 1. Maps of the study areas. 1) Lasek Brzozowy, 2) Przy Bażantarni Park, 3) Świętokrzyska street, 4) Nowy Świat street, 5) Warsaw Old Town. Source: Own elaboration based on: Floryan 2007, Plan Warszawy n.d.

were interviewed. The place of study was 50 m from Belgradzka street, which had moderate traffic. It was surrounded by a few apartment blocks and one supermarket. Traffic noise was the dominant sound, but human and natural sounds were also present. The survey was conducted on November 16 and 18, 2014 (1–6°C, both sunny and overcast, wind speed 18–19 km/h).

Nowy Świat street is a historic place. It is a restricted traffic zone, but transportation is still important and even the dominant function there. This location was selected because of its touristic potential and because it had a soundscape that is generally not preferred (as defined by studies); that is, dominated by mechanical sounds with only a small amount of human and bird sound. The survey interviewed 106 people and was conducted on November 26–28, 2014 and on December 5, 2014. On these days the temperatures ranged from -4°C to 3°C, the days were both sunny and cloudy, no rain, wind speed 5–13 km/h.

Several people were interviewed in the Old Town because of its tourist function and preferred soundscape (as defined by studies; i.e., dominated by human sounds with the natural sounds of birds and with mechanical sounds in the background). This was an additional study place, surveyed in order to probe whether, in a tourist area with a positive soundscape, the declared expectations would be different from those in Nowy Świat street. Some 16 people were interviewed. The small number of participants resulted from the additional survey's character, as well as there being little interest in taking part in the survey. The survey was conducted on October 13, 2017 and November 17, 18, 20, 2017. On these days the temperature was 0°C–12°C, the days were both sunny and cloudy, no rain, wind speed varied between 11 km/h and 28 km/h.

The intersection of Świętokrzyska and Marszałkowska streets is located in the inner city. The location was selected because of

its city centre character and rather unpleasant soundscape (as defined by studies; i.e., dominated by the mechanical sounds of buses, trams, and cars; with a small amount of human sounds). The survey was conducted on the December 3, 2014 and December 4, 2014. There were 90 people interviewed. On these days the temperature varied from -5°C to -1°C , it was sunny, no rain, wind speed was $6-9 \text{ km/h}$. Przy Bażantarni Park is a recreational area in the Ursynów district. There are two playgrounds, a jungle gym, a skate park, footpaths, and relaxation corners. The park is adjacent to a church and surrounded on three sides by streets. The park users were interviewed on winter Sundays when the soundscape was rather quiet, with the sounds of nature, people, and traffic being balanced. The survey was conducted on November 30, 2014 (-8°C to -4°C , sunny, wind speed 10 km/h) and December 7, 2014 ($-4-0^{\circ}\text{C}$, sunny, wind speed 10 km/h). There were 74 people interviewed.

Data collection

Random users of the space were asked *in situ*. The answers were recorded on a hand-held recorder, then written down by a researcher for further analysis. It was a standardized interview. The precise structure of the survey was clarified during the pilot study.

The following questions were asked:

- 1) Please listen to the sounds that surround us for a moment and rate how much you like them (on a scale of 1 to 5; 1 – strongly dislike, 2 – dislike, 3 – neither like nor dislike, 4 – like, 5 – strongly like).
- 2) What do you like about these sounds?
- 3) What should be changed so that you would like it more?
- 4) On a scale of 1 to 5 please rate if these sounds are appropriate to area's function (1 – very inappropriate, 2 – inappropriate, 3 – neither appropriate nor inappropriate, 4 – appropriate, 5 – very appropriate). (The function was defined by the researcher: in Nowy Świat street and the Old Town the function was tourism, in Świętokrzyska street – metropolitan area, Przy Bażantarni Park – recreational, and the Lasek Brzozowy neighbourhood – residential).
- 5) What should be changed in order to make the surrounding sounds more appropriate to the place's function? At the end, some demographic questions were asked.

At the end some demographic questions were asked.

Results

Sample profile

The sample consisted of 127 males (41%) and 182 females (59%), making a total of 309 respondents. Most of them (253) were residents of Warsaw. The respondents varied according to the study place in which they were interviewed.

In the Lasek Brzozowy neighbourhood most respondents lived nearby to the study area (83%) and all of them were Warsaw residents (70% for more than 10 years). Their ages varied, and there was no dominant age group.

In Nowy Świat street there were mostly Warsaw residents (78%) and more than half of them (53%) were resident for more than 10 years. Most claimed they did not live in the area of Nowy Świat street; they were probably on their way to work, school, or were running errands. Of the total 62% were 18–40 year olds.

In the Old Town, 63% of participants were tourists who did not live in Warsaw (31% were foreigners). The majority of respondents were 18–40 year olds.

At Przy Bażantarni Park, most respondents (96%) lived nearby, while only one person did not live in Warsaw. Of the total 74% had lived there for more than 10 years. The surveys were conducted on Sundays, so most of the participants were on their

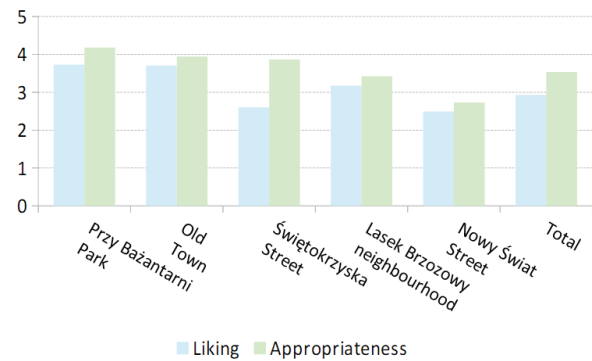


Figure 2. Mean rates of liking soundscapes, and the sense of appropriateness of soundscapes in relation to their function.

Source: Own elaboration based on the Warsaw survey results
Soundscape advantages

way to or back from the nearby church. Regarding ages, 50% of them were 18 to 40 year olds, 22% were 41–60 year olds, and 25% were older than 60.

In the Świętokrzyska street most of the participants (82%) declared that they lived in Warsaw, and 42% claimed they lived nearby the study area. Regarding age, 49% of them were 18 to 40 year olds, 17% were 41–60 year olds, and 30% were older than 60.

Soundscape rates

The mean rates have been summarized in Figure 2. In the case of questions about liking the soundscape, the highest rate was at Przy Bażantarni Park (mean rate [M] of 3.73, standard deviation [SD] of 1.01) and Warsaw Old Town ($M=3.71$, $SD=1.05$). The most rated soundscape was in Nowy Świat and Świętokrzyska streets ($M=2.49$, $SD=1.14$; and $M=2.60$, $SD=1.09$, respectively).

In the opinion of respondents, the most appropriate soundscape in relation to function was at Przy Bażantarni Park ($M=4.18$, $SD=1.03$), followed by the Old Town ($M=3.94$, $SD=1.09$), Świętokrzyska street ($M=3.87$, $SD=1.19$), the Lasek Brzozowy neighbourhood ($M=3.42$, $SD=1.30$), while the least appropriate soundscape was in Nowy Świat street ($M=2.73$, $SD=1.24$).

Mean rates for soundscape appropriateness in relation to function were higher but quite similar in every case to the rates for liking, except in the case of Świętokrzyska street where mean rate of appropriateness was significantly higher.

The question concerning the advantages of soundscapes was open-ended. The analysis was focused on two issues: the sound sources mentioned and a model for soundscape perception (Axelsson et al. 2010).

Firstly, the answers were examined with regard to the sound source's category. Three categories were created: human sounds (directly related to human activities and purposeful sounds, like music or church bells), natural sounds, and mechanical sounds.

In the Old Town and at Przy Bażantarni Park most of the respondents described the advantages of the soundscape using the sound source category, for example:

- 'The ambient [sounds], people eating, the birds, musicians, the conversations, the kids I suppose, talking and laughing' (the Old Town).
- 'You can hear kids, they are playing; hereabouts are birds, nature' (Przy Bażantarni Park).

These were places with quite a significant presence of natural and human sounds (generally pleasant), so it was

probably easier for respondents to refer to a specific sound.

As Figure 3 shows, most of the respondents (63%) in the Old Town liked human sounds, especially music being played live. Also natural sounds were often mentioned (38%), most often birdsong. In Przy Bażantarni park, 47% of respondents liked natural sounds (birdsong, wind); 22%, human sounds (children playing, footsteps); and 7%, mechanical sounds (cars, buses, planes). In Nowy Świat street, participants liked human sounds (29%. E.g. footsteps, talking, music, laughing, sounds of children, church bells) and mechanical sounds (10%, mostly cars and buses). Świętokrzyska street was the only place where mechanical sounds (cars and trams) were the most often mentioned sound source category: 14% of respondents gave this answer. The respondents also mentioned human sounds (7%, mostly talking) and nature sounds (4%, birdsongs and wind). In the Lasek Brzozowy neighbourhood just a few people used sound sources to describe the soundscape advantages, and they mentioned natural and human sounds.

Secondly, answers were examined in relation to the model by Axelsson et al. (2010), in which human perception of soundscape is analysed along two dimensions: pleasantness and eventfulness. Soundscapes can be pleasant (eventful/exciting, uneventful/calm) or unpleasant (uneventful/monotonous and eventful/chaotic). Answers were interpreted and assigned to one of these four categories if they contained terms related to:

- a) life, dynamics, happening, motion, stimulation, activity, variety, lack of silence, (exciting category); for example:
 - ‘Movement, life, happening, lack of loneliness.’
 - ‘The fact that there is something happening, I like activity.’
- b) chaos (chaotic category):
 - ‘Natural chaos.’
- c) calm, silence, allowing reflection, toned, relaxing, mild (calm category); for example:
 - ‘Calm, harmony, not overwhelming.’
 - ‘You can listen to your own thoughts.’
 - ‘Calmness,’ ‘Relative calmness.’
- d) regularity (monotonous category); for example:
 - ‘Monotony, there is a quite constant volume of sound.’

As Figure 4 presents, for most people (34%) the soundscape of Przy Bażantarni park was calm, while at the same time, for some respondents, sounds were exciting (4%). The Old Town for some people was calm, for others, exciting. For Nowy Świat street, 25% said the advantage of the street’s soundscape was its excitement; few people described it as calm (6%) or monotonous (3%). Świętokrzyska street, for 11%, was exciting, 4% calm, 3% monotonous, and 1% chaotic. Only one person described the Lasek Brzozowy neighbourhood soundscape as calm.

There was also another category often used by respondents – terms related to the urban and metropolitan character of the soundscapes. Such terms were mentioned by 15% of respondents (23% in Świętokrzyska street and 19% in Nowy Świat street). Terms such as ‘urban’ or ‘metropolitan’ appeared often next to words describing excitement.

Suggestions for changes

The suggestions for change varied in relation to place and purpose (Fig. 5).

The dominant method for making the soundscape more pleasant was to reduce the amount of mechanical sound: 78% of respondents gave this answer in Nowy Świat street (they suggested the reduction or elimination of road traffic, quiet cars and buses – hybrid or electric, less use of horns and sirens); 61% in Świętokrzyska street (less cars, trucks, motorcycles, buses, trams and general motor noise; less horns, construction work, and

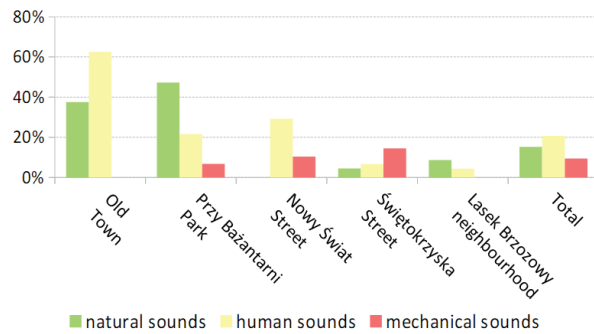


Figure 3. The most liked aspects of soundscapes based on the sound source category mentioned in the spontaneous responses. Source: Own elaboration based on the Warsaw survey results

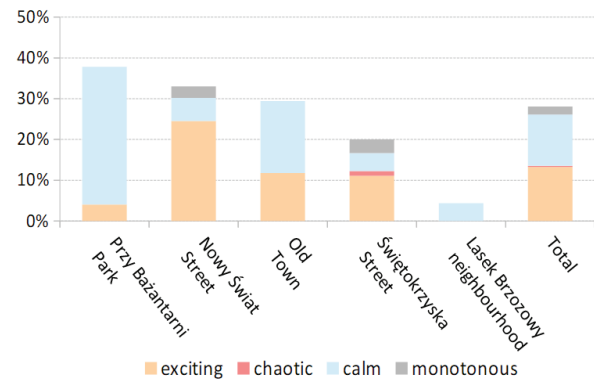


Figure 4. The most liked aspects of soundscapes based on the human perception of soundscape model categories. Mentioned in spontaneous responses. Source: Own elaboration based on the Warsaw survey results

sirens); 52% in the Lasek Brzozowy neighbourhood (road traffic and aeroplane noise, construction work, sirens, other machines like lawn mowers, leaf blowers, snow ploughs, and ventilation devices); 47% at Przy Bażantarni Park (less car and aeroplane noise); and 31% in the Old Town (eliminate cars). Much fewer answers concerned increasing natural sounds (mainly birdsong and the rustling of leaves), however, this was relatively significant in the Old Town and in the Lasek Brzozowy neighbourhood. The Old Town was the only place where quite a few people (19%) claimed they wanted to hear more human sounds (music mainly related to Warsaw history).

When asked about suggestions for changing soundscapes in order to better suit the place’s specific function, people in Nowy Świat street mainly proposed decreasing mechanical sounds (51%) and increasing human sounds (mostly music of various kinds. 17%). Some of them claimed that soundscapes could not be changed because of the necessity of transportation for users. The solution people most often proposed was increasing the use of electric or hybrid private and public vehicles, or implementing restricted traffic zones. In the Lasek Brzozowy neighbourhood and in Przy Bażantarni Park people most often proposed decreasing mechanical sounds, especially road traffic, aeroplanes, and construction work. Answers rarely contained specific solutions. In the Old Town the most important thing for 38% respondents was to increase the sounds of music related to local tradition. In Świętokrzyska street there were two ways of thinking about the city centre. The first one (more frequent) treated the metropolitan centre as a place where car traffic

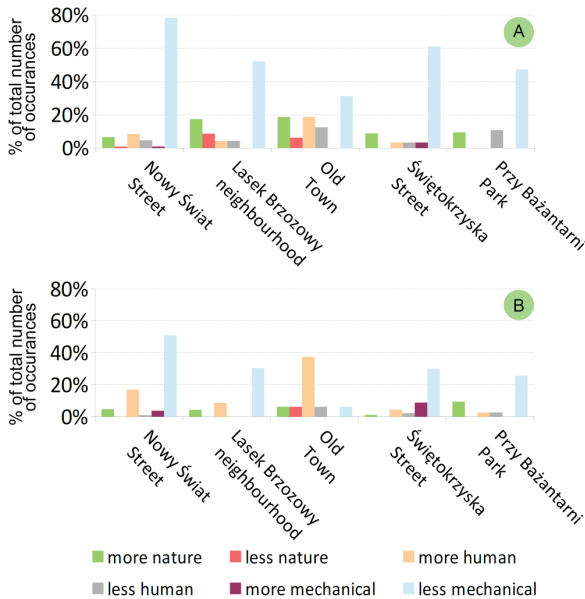


Figure 5. Suggestions for changes in soundscapes, categorized by sound source: A – in order to make it more likeable; B – in order to make it more appropriate for the place's function (as defined by the investigator). Source: Own elaboration based on the Warsaw survey results

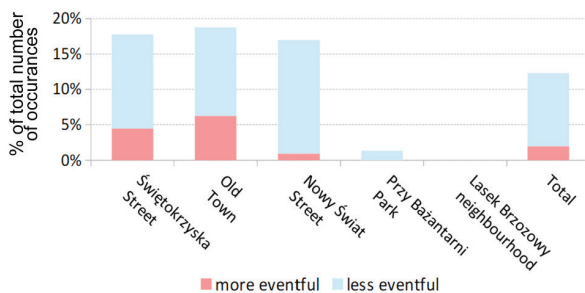


Figure 6. Suggestions for changes in order to make soundscapes more likeable in relation to eventfulness. Source: Own elaboration based on the Warsaw survey results

should be decreased and public transport increased, and bicycle infrastructure expanded. The second group regarded the traffic noise as an integral part of city centre, so traffic noise should be louder. This is why it is the only place where a few people (9%) proposed that the soundscape should be more mechanical.

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As shown on Figure 6, there was only a few people who proposed that soundscapes should be more dynamic. Mostly, if people referred to stimulation, they postulated calmness.

Conclusions and discussions

The subjective values for soundscapes are differentiated according to the degree of annoyance related to traffic noise (both public and private transport), and the content of natural and human sounds. Soundscapes dominated by mechanical sounds have lower rates than those with a smaller amount of mechanical sounds and in which natural and human sounds are noticeable or even dominant. This confirms the general preference that people prefer natural and human sounds and reject mechanical sounds, which corresponds to the findings of Guastavino 2006, Liu et al. 2017, Ismail 2014, Nilsson 2007, Hong & Jeon 2015, Romanowska 2014, Jennings & Cain 2016.

Mean rates of the appropriateness in relation to function are in every case higher than the mean values of the subjective impression. In Świętokrzyska street the difference between the mean subjective value and mean rates for appropriateness, is considerable. Bruce and Davies (2014) found that the perception of a soundscape is affected by the expectations of the listeners. This research does not undermine these results but shows that people differentiate between what they subjectively like and what suits the situation.

When asked about the advantages of soundscapes, people more often mentioned specific sound sources when they could easily define them and when natural and human sounds were noticeable. The soundscape advantages for places dominated by mechanical sounds were rather described through the lens of their character (e.g., 'urban,' 'relatively calm,' 'various,' 'something is happening in there'). The model of human perception by Axelsson et al (2010) was reflected in the spontaneous responses about the advantages of soundscapes, mainly in the categories of 'calm' and 'eventful.'

The results confirm, in many instances, Jenning & Cain's (2016) statement that soundscapes have to be evaluated in their contexts. The suggestions for changes in soundscapes are most often related to mechanical sounds, but in places with a touristic function there is a growing need for an increase in human sounds; and even in places whose function is metropolitan there was a group of opinions that there should be more mechanical sounds. Romanowska (2014) found that people's expectations change in relation to a place's function. According to this study, a place's function seems to be an important variable, but locally there is a lot of individual factors that influence perception – which is consistent with Bernat (2015) – if the context is ignored while planning, it can raise social conflict linked to sound.

The specific solutions most often mentioned for improving soundscapes were as follows: the reduction or elimination of road traffic, and quiet cars and buses – hybrid or electric. Respondents in the Old Town spontaneously suggested an increase in music, especially related to local tradition. It confirms the postulate (Losiak 2008) that distinguishes between city music (related to local culture) and music in the city (universal).

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