Published paper

Yu, L., Kang, J. (2010) *Factors influencing the sound preference in urban open spaces*, Applied Acoustics, 71 (7), pp. 622-633
http://dx.doi.org/10.1016/j.apacoust.2010.02.005

Elsevier Editorial System(tm) for Applied Acoustics
Manuscript Draft

Manuscript Number: APAC-D-08-00053R3

Title: Factors Influencing the Sound Preference in Urban Open Spaces

Article Type: Research Paper

Keywords: Sound; sound preference; urban open space

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Abstract: In this paper, based on a large scale survey in Europe and China as well as corresponding laboratory studies, the influencing factors on the sound preference evaluation, considering social, demographical, physical, behavioural and psychological facets, have been systematically examined. Various sound types have been considered, including natural, human, mechanical and instrumental sounds. In terms of social/demographical factors, the results suggest that age and education level are two factors which generally influence the sound preference significantly, although the influence may vary with different types of urban open spaces and sounds. With increasing age or education level, people tend to prefer natural sounds and are more annoyed by mechanical sounds. It has also been found that gender, occupation and residence status generally would not influence the sound preference evaluation significantly, although gender has a rather strong influence for certain sound types such as bird sounds. In terms of physical factors (season, time of day), behavioural factors (frequency of coming to the site, reason for coming to the site), and psychological factors (site preference), generally speaking, their influence on the sound preference evaluation is insignificant, except for limited case study sites and certain sound types. The influence of home sound environment, in terms of sounds heard at home, on the sound preference has been found to be generally insignificant, except for certain sounds. It is noted that there are some correlations between social/demographical factors and the studied physical/behavioural/psychological factors, which should be taken into account when considering the influence of individual factors on sound preference.

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Factors Influencing the Sound Preference in Urban Open Spaces

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Abstract

In this paper, based on a large scale survey in Europe and China as well as corresponding laboratory studies, the influencing factors on the sound preference evaluation, considering social, demographical, physical, behavioural and psychological facets, have been systematically examined based on statistical analyses for each of the nineteen case study sites. Various sound types have been considered, including natural, human, mechanical and instrumental sounds. In terms of social/demographical factors, the results suggest that age and education level are two factors which universally influence the sound preference significantly, although the influence may vary with different types of urban open spaces and sounds. With increasing age or education level, people tend to prefer natural sounds and are more annoyed by mechanical sounds in general. It has also been found that gender, occupation and residence status generally would not influence the sound preference evaluation significantly, although gender has a rather strong influence for certain sound types such as bird sounds, especially at certain case study sites. In terms of physical factors (season, time of day), behavioural factors (frequency of coming to the site, reason for coming to the site), and psychological factors (site preference), generally speaking, their influence on the sound preference evaluation is insignificant, except for limited case study sites and certain sound types. The influence of home sound environment, in terms of sounds heard at home, on the sound preference has been found to be generally insignificant, except for certain sounds. It is noted that there are some correlations between social/demographical factors and the studied physical/behavioural/psychological factors, which should be taken into account when considering the influence of individual factors on sound preference.

Keywords: Sound; sound preference; urban open space

1. Introduction

With the renaissance of city centres, urban open spaces are re-conceptualised with the new ‘urbanity’ [1]. In order to create a friendly environment, rethinking the urban open spaces from an ecological viewpoint is important [2]. Sound quality is considered as a key part of ecological/sustainable development of urban open spaces [3-4]. Soundscape, also called acoustic landscape, is simultaneously a physical and a social environment when one perceives the environment with his/her hearing, where a sound is a basic element in the ‘scape’ [5]. This ‘scape’ physically consists of the sounds, the energy waves, the listeners, and the listener’s social circumstances, dictating who gets to hear what [6-11]. Subjective effects of soundscape rely on the perceptions to acoustic phenomena through a cognitive process in which two concepts are used: sounds and noises [12]; it is essential to determine aesthetic satisfaction of an aural ‘scape’ [13]. In many soundscape-related studies, the general evaluation of a soundscape is usually considered as sound level evaluation, namely subjective evaluation of loudness, normally for background noise [15-20], and as sound preference evaluation, namely the evaluation of foreground sounds [10-12, 21-22]. As basic components, individual sounds are important in the whole soundscape [23]. The evaluation of the sound preference is therefore crucial to determine soundscape quality in a specific space.

With ever increasing community noise since industrial revolution, a large number of studies in examining noise annoyance and noise effects on health have been carried out [15-17]. Recently, accounting for meaningful acoustic environments, issues of sound identification and its effects on aural perceptions have been brought forward with a cognitive or ecological approach [12]. However, the study on the sound preference, especially in urban open spaces, has been rather limited, although it has been suggested that the sound preference is affected by various factors from both physical and social aspects [24-26]. In our previous study [13-14], the sound preference was investigated in some typical urban squares, as a part of an overall soundscape research. In the investigation presented in this paper, however, a more systematic analysis has been made based on case studies in nineteen urban open spaces in Europe and China as well as on laboratory experiments.

Environmental psychologists pointed out that the implicit attributes of social/cultural factors and the explicit attributes of physical surroundings are interrelated to affect people's perception of a physical sound [27-28]. Therefore, the study of the sound preference evaluation is mainly to explore the relationships between the preference of a sound and the implicit and explicit attributes. Unlike the preferences of musical listening which focus on the sound itself, the judgement of everyday sound listening is to gather relevant information about our surrounding environment [11]. In this study, the influencing factors on the sound preference evaluation, considering social, demographical, physical, behavioural and psychological facets, have thus been systematically examined based on a series of large scale field survey. The influences of those factors on the sound level evaluation have also been examined in a parallel paper [29]. It is expected that the results are useful for soundscape design in urban open spaces, and also helpful for formulating input variables for a soundscape prediction model based on artificial neural networks [30-33].

2. Methodology

2.1 Field survey

From 2001 to 2005, a series of field studies were carried out in fourteen European and five Chinese urban squares. The case study sites were selected from nine cities in six countries, namely Bahnhofsplatz, Germany Kassel (site 1); Florentiner, Germany Kassel (site 2); Karaiskaki, Greece Athens (site 3); Seashore, Greece Athens (site 4); Kritis, Greece Thessaloniki (site 5); Makedonomahon, Greece Thessaloniki (site 6); IV Novembre, Italy Milan (site 7); Piazza Petazzi, Italy Milan (site 8); Jardin de Perolles, Switzerland Frobourg (site 9); Place de la Gare, Switzerland Frobourg (site 10); All Saint’s Garden, UK Cambridge (site 11); Silver Street, UK Cambridge (site 12); Barkers Pool, UK Sheffield (site 13); Peace Gardens, UK Sheffield (site 14); Chang Chun Yuan Square, China Beijing (site 15); Xi Dan Square, China Beijing (site 16); Century Square, China Shanghai (site 17); Nanjing Road Century Square, China Shanghai (site 18); and Xu Jia Hui Park, China Shanghai (site 19). The case study sites represented a variety of microclimatic and macroclimatic conditions, a diversity of urban square types, and a range of cultural backgrounds. The interviewees were from a range of social groups in terms of their age, gender, occupation, education level and residential status (local or non-local).

Information gathered through the questionnaire surveys and observations included the interviewees' social/cultural background, their activities and behaviours on site, the sounds they identified, and their sound preferences. The acoustic questions were generally introduced as a part of the investigation of the overall physical environment, to avoid possible bias. Objective measurements of the sounds were also made and other physical conditions of the surroundings were recorded during the interviews. A database was consequently established, with variables of social attributes including age (1: <12; 2: 12~17; 3: 18~24; 4: 25-34; 5: 35-44; 6: 45-54; 7: 55-64; 8: >65); gender (male and female); occupation (students, working people and others, such as unemployed and pensioners); education (primary, secondary and higher level); residential status (local and non-local); sounds often heard at home (bird, insect, speaking, music, and traffic), preference of the site (like the site or do not like the site for certain reasons), frequency of coming to the site (first time, per year, per month, per week, per day for EU sites; and first time, occasionally, sometimes, often, daily for Chinese sites); and reason for coming to the site (for the equipment/services of the site, for children playing and private meetings, for business/meeting/break, for attending social events, passing by). Also included in the database were some physical attributes including season and time of day during the interviews, which were found to be related to noise evaluation in previous studies [34-35]. In Table 1 the above factors and their categorisations and scales are summarised. Wherever appropriate, numerical scales were used in the questionnaires along with the categorical scales.

The frequency analyses showed that normal distribution was generally followed for the factors studied at each case study site.

In Table 1 it can be seen that three categories are assigned to education. Education is a broad concept, referring to all the experiences in which a person could have learned, and it is an important part of socialisation [36]. While the comparison between people with different education background is rather complicated, in this study a comparison has simply been made between different education levels. Generally speaking, there are three levels, namely primary, secondary and higher education despite the disparity of adult and alternative education in which no distinct difference exists from low to high level [36]. For occupation, in the surveys a range of categorisations were used. However, considerable differences were found between different cities and countries in terms of the definitions and categorisations of occupations. In order to make comparisons within a common framework, occupations were then re-arranged to form three categories. In terms of the reason for coming to the site, similarly, the survey results were also re-arranged from nine to five categories, given the differences between case study sites, and small sample sizes in certain categories and case study sites.

The questions were initially developed in English, and then translated into other languages. Since the surveys were carried out over five years, in several phases, some slight modifications were made in the questionnaire design. For example, in the surveys in China the question about the sounds often heard at home was added, but the site preference was not asked.

In Table 2 the noticed sounds are classified, where the results are listed based on each of the nineteen case study sites, so that possible differences caused by the interviewees' social/cultural backgrounds can be examined. It is noted that in all the Tables in this paper, the grey areas indicate where the sounds/variables were unavailable/inapplicable. For some sound sources, sub-divisions are made in the table, including bell (bells of church/town hall, bells of clock), music (played on-site in the open spaces, from nearby stores, from passing car) and traffic (car passing, bus passing and vehicle parking). It can be seen that in most squares the noticed sounds were people's speaking and traffic. The sound of footsteps was often noticed in squares located in city centres. Other commonly noticed sounds included water (site 1, 7, 12, 14, 18, 19), bird (site 9, 11, 15, 19), and children's shouting (site 3-6, 8, 9, 14, 15, 19). For the case study sites in Sheffield and China, all the sounds listed in Table 2 were evaluated in terms of the sound preference even they were not heard during the interview, whereas in other sites only noticed/heard sounds were evaluated. For the subjective evaluation of sound preference, a 3-point scale was used, namely -1: favourable, 0: neither favourable nor annoying, and 1: annoying. In a pilot study, a 5-point scale was also used, from -2 to 2, but it was found that some interviewees were not sure about the differences between -2 and -1, as well as between 1 and 2.

2.2 Laboratory experiment

Laboratory experiments were also made to examine the influence of some factors on the sound preference in depth, under controlled conditions. The experimental study was designed in three stages, with 56 participants in total. In stage one nine sounds similar to the field studies were listed to inquire the participants' sound preferences, without actually playing back the sounds. In stage two, six sounds related to the noticed sounds in the case study sites were played back through headphones to the participants, and the evaluations of the sound preference, tranquillity, comfort and pleasantness were made. In stage three, five video recordings with sound relating to the case study sites were presented, examining the aural/visual interactions. It should be noted that in the laboratory experiments the social/demographical profiles of the subjects, considering age, gender, occupation and education level, were less representative than those in the field studies and also, the types of sound were less. As a result, direct comparison between field studies and laboratory results has not been always feasible. In Table 3 the studied sounds in the laboratory experiments are shown, where Lab01, 02 and 03 refer to the three stages respectively.

3. Influence of social/demographical factors on the sound preference

The influence of age, gender, occupation, education level and residence status on the sound preference has been analysed using SPSS [37] in terms of the Pearson/Spearman correlation and Independent t-test wherever appropriate. Again, it is noted that such analyses have been carried out based on individual sites, so that possible cultural differences can be examined. In Table 4-6 the influence of social/demographical factors on natural sounds (bird, water, insect), human sounds (speaking, footsteps and children's shouting) and mechanical sounds (car passing, bus passing, vehicle parking, and construction) are shown, respectively. The instrumental sounds are not included since there were barely church bells in the Chinese sites, and the music types played in the Chinese sites were rather different from those in the European sites. This, in a way, shows the importance of considering cultural differences in studying sound preferences. For the laboratory experiments, since the sound evaluation in stage three was only made for combined sounds and it was not directly comparable to the results of field studies, only results in stage one and two are included, as Lab01 and Lab02 in Table 4-6. Table 7 summarises the percentage of the sites with significant influences, for all sound types. It is noted that in this paper, marks * and ** indicate significant difference or correlation, with * representing $p<=0.05$ and ** representing $p<=0.01$.

3.1 Age

In Table 4 and 7 it can be seen that for two natural sounds, namely bird and insect sounds, age has a rather strong influence on the sound preference, as six out of eleven, and three out of eight studied cases having statistically significant correlations, respectively. With the increase of age, the sound preference for bird and insect sounds also increases, reflected by the negative correlation coefficients in most of the studied cases, although in site 11 and 14 positive correlations are found (see Table 4), two for bird sound and one for insect sound, but the coefficients are small and statistically insignificant. It is interesting to note that for another type of natural sound, water, only one out of ten studied cases show statistically significant correlations between age and the sound preference evaluation. In other words, age has less influence on the sound preference of water, perhaps because water plays a particular role in urban soundscape and it is enjoyed by all ages [38] – the average sound preference score for water, considering of all age groups, is -0.45 in this study.

The influence of age on the sound preference of two human sounds, namely speaking and footsteps, is generally less compared with that for natural sounds including bird and insect sounds, as can be seen by comparing Table 4 and 5. However, it is interesting to note that the subjective evaluations of these two sounds are more varied among cities, suggesting the possible effects of cultural factors. It is noted, however, for children's shouting, age has a relatively strong influence on the sound preference, as seven out of fifteen studied case having statistically significant correlations, and these sites are distributed in different cities and countries.

For mechanical sounds including car passing, bus passing, vehicle parking and construction, the influence of age on the sound preference is also relatively low, as can be seen in Table 6 and 7. In Table 6 it is interesting to note that the correlation coefficients for the sound of vehicle parking are all positive except one site (site 16, Beijing Xi Dan Square), but with a small and statistically insignificant correlation coefficient, suggesting that with the increase of age, people may become slightly more annoyed by this sound. For the sound of construction, it is noted that a significant correlation is only found in one site, namely site 14 (Sheffield Peace Gardens), indicating that age barely influences the preference of this sound. A possible reason for the significant correlation in the Peace Gardens was that the construction work/noise during the interviews was related to the change of the site, which was more objected by older people.

Whilst in this study some correlations between age and sound preference have been found depending on different types of sound, previous studies in terms of noise annoyance suggested varied results regarding the effect of age [29, 39-41].

3.2 Education level

In Table 7 it can be seen that compared to age, education level is a more significant influencing social/demographical factor on the sound preference and the influence varies with different sounds. The influence of education level on the sound preference evaluation is generally more significant for mechanical sounds compared to natural and human sounds. It can be explained that mechanical sounds are usually related to the sensation of noise, and it has been found in a parallel study that education level is the most influencing factor on the sound level evaluation compared to other social/demographical factors [29]. Other studies also showed that people with a higher education level could be slightly more annoyed by noise [41-42], although some researchers argued that education had no significant effect on the noise evaluation [43-44]. From Table 6, it can be seen that in most studied cases with mechanical sounds, the correlation coefficients are positive, indicating that people with a higher education level are more annoyed by mechanical sounds. For the small number of negative coefficients the correlations are generally low and not at a significant level, although it is noted that most case study sites with a negative correlation are in Greece, perhaps suggesting the relatively weak influence of education level on the sound preference evaluation there. For natural sounds, conversely, the correlation coefficients are predominately negative, suggesting that with the increase of education level people tend to prefer natural sounds more. For human sounds, there are mixed positive and negative correlation coefficients, and it seems that there is no clear tendency in terms of the distribution of cities and countries.

3.3 Gender, occupation, and residential status

In Table 7, it is found that the influence of gender on the sound preference evaluation is limited for all studied sounds except the sound of bird, as seven out of eleven studied cases have a significant difference between the sound preference evaluation of males and females. However, from Table 4 it is noted that the differences contain both positive and negative values, suggesting there is no consistent tendency. A possible reason for this might be cultural differences, as the negative values are from the Sheffield sites as well as the laboratory experiments in Sheffield, whereas the positive values are mainly from the Shanghai sites. In other words, females in Sheffield preferred bird sounds less than males, whereas females in Shanghai preferred bird sounds more than males. For other sounds there are also mixed positive and negative values in terms of the differences between genders. The differences between genders have also been examined in other studies. Mehrabian's research indicated that, in general, women are slightly more sensitive to a sound than men [45], whereas some other studies seem to suggest that the effect of gender on noise annoyance is not important [13-14, 41, 43].

Similar to gender, occupation also has little influence on the sound preference. In Table 7 it can be seen that the percentage of the studied cases where significant correlations exist is very low, all below 40%. From Table 4-6 it is seen that the correlation coefficients are mixed with positive and negative values.

The influence of residence status on the sound preference evaluation is generally also not strong, as can be seen in Table 7. Fig. 1 shows the mean difference between local and non-local residents in terms of the sound preference evaluation, considering all studied cases. It is interesting to note that from natural sounds to mechanical sounds, the mean difference between local and non-local residents becomes higher; suggesting that non-local people are generally more annoyed by mechanical sounds in urban squares, especially construction sounds.

4. Influence of physical, behavioural and psychological factors on the sound preference

Based on the statistical analyses of each case study site, this section examines the influence on the sound preference evaluation from physical, behavioural and psychological factors, including season, time of day, frequency of coming to the site, reason for coming to the site, and the site preference. Some other behavioural factors, such as wearing earphones, reading/writing, and moving activities, are considered to be less relevant to the sound preference evaluation and thus not included in the analysis, although in the sound level evaluation their influences have been studied [29]. Corresponding to Section 3, ten individual sounds ranging from natural to mechanical sounds are examined. In Table 8 the effects of season and time of day are shown, and in Table 9 the effects of frequency of coming to the site, reason for coming to the site and the site preference are demonstrated. Table 10 summarises the percentages of the sites with significant influences.

For the Chinese sites, since the surveys were carried out in summer only, the effect of season is not examined. In Shanghai Nanjing Road Square (site 18) all the surveys were carried out in midday and thus, the effect of time of day is not examined for that site. From Table 8 it can be seen that for natural sounds, the effects of season and time of day on the sound preference are generally trivial as a significance level only shows in three studied sites, and only for two sounds. For water sound, season has a significant influence on the sound preference in two out of five studied sites, namely site 7 (Milan IV Novembre) and site 12 (Cambridge Silver Street), and for bird sound preference, time of day only has a significant influence in site 9 (Fribourg Jardin de Perolles).

For human and mechanical sounds, the effects of season and time of day are relatively higher compared to that for natural sounds, although the number/percentage of the case study sites with a significant level is still rather low, generally less than 30%, as can also be seen in Table 10, except for speaking, footsteps and vehicle parking, where the percentage is 46.2%, 37.5% and 50%, respectively, in terms of the season effect. The effects of season and time of day on the noise annoyance have also been indicated in other studies [46-48]. It is interesting to note that in three Greek case study sites, including Athens Seashore Square (site 4), Thessaloniki Kritis Square (site 5), and especially, Thessaloniki Makedonomahon Square (site 6), the effect of season and time of day is considerably greater than that of other sites, suggesting the importance of considering cultural and climate conditions.

In Table 9 only noticed sounds in the case study sites are included, since unnoticed sounds are considered less relevant to these behavioural/psychological factors for the studied sites. Between frequency of coming to the site and the sound preference, the correlation is not significant for natural sounds, but for human and mechanical sounds, significant correlations exist in a small percentage of the sites, as shown in Table 10, except for construction, but for which only three sites are analysed.

The effect of the site preference on the sound preference is insignificant for natural sounds, although only a small number of sites are considered. Conversely, for some human or mechanical sounds, especially children’s shouting, car and bus passing, and vehicle parking, the effect of the site preference is significant in a high percentage of sites, at 42-100%, as shown in Table 10. A possible reason is that those sounds are distinguishable sounds on the sites, as keynotes or soundmarks and also, some sounds are rather loud, such as children's shouting.

While the influence of frequency of coming to the site and the site preference are generally insignificant on the sound preference, between the reason for coming to the site and the sound preference evaluation the correlations are even less significant, except for insect sound and construction sound, although the results of these two sounds are only based on two to three case study sites.

5. Influence of home sound environment on the sound preference

Long-term acoustic experience has been found to be an important factor in influencing the sound level evaluation in urban open spaces [29]. It has been also found that long-term changes in noise exposure are important for general noise evaluation [48-50]. In the five Chinese case study sites a question was asked about the sounds usually heard at home. The difference in the sound preference of a given sound between people having or not having the sound at home is then examined through Independent t-tests for each case study site, and the results are shown in Table 11. It is noted that whilst five sound types, namely bird, insect, speaking, traffic and music, were included for the home environment, for the fields surveys more detailed classifications were made, including three types of traffic sounds and three types of music.

In Table 11 it can be seen that the differences between the two groups of people are insignificant for most of the sounds, in most of the case study sites, except for bird sounds and music from passing car, for which three out of six study cases show significant differences. In other words, the sounds heard at home generally do not affect the sound preference in urban open spaces significantly. A possible reason is that some sounds, such as traffic, are rather common, so that the experience at home is less important in terms of the sound preference. For bird sound, it is interesting to note in Table 11 that the mean differences are all positive, suggesting that those people who hear bird sounds often at home may tend to prefer bird sounds in urban open spaces too.

6. Relationships between social/demographical and physical/behavioural/psychological factors

Whilst the influence of various social, demographical, physical, behavioural and psychological factors on the sound preference has been analysed above, the relationships between those factors are examined in this section, since the influence of certain factors may be affected by their relationships with other factors. Although some relationships are commonly recognised, for example, it is normally expected that how often one comes to a site should correlate to whether he/she is a local resident, it is still useful to systematically examine such relationships, given that the actual conditions varied considerably among different case study sites. In Table 12 relationships between social/demographical and physical/behavioural/psychological factors are shown, where it is noted that the reason for coming to the site is not included due to its weak influence on the sound preference evaluation, as can be seen in Table 8 and 9. Corresponding to Table 12, Table 13 summarises the percentages of the sites with significant influences.

It can be seen from Table 12 and 13 that age generally has strong correlations with physical/behavioural/psychological factors, in 55.6% of the sites in terms of time of day, 47.4% of the sites in terms of frequency of coming to the site, and 50.0% of the sites in terms of the site preference. It is also shown that occupation is more related with frequency of coming to the site, education level is highly related with the site preference, and the residence status is closely related to frequency of coming to the site. Conversely, the influence of gender is rather weak. By comparing various physical/behavioural/psychological factors, it is seen that the frequency of coming to the site and the site preference are most related to various social/demographical factors, whereas season is the least related.

Table 14 summarises the relationships among the sound preference, social/demographical factors, and physical/behavioural/psychological factors. It can be seen that simultaneous effects between social/demographical and physical/behavioural/psychological factors may exist in over 50% of the cases where significant influences of physical/behavioural/psychological factors have been found. For the frequency of coming to the site and the site preference such simultaneous effects are generally considerable. Compared with natural sounds, for human and mechanical sounds the simultaneous effects are greater. It is interesting to note that the simultaneous effect in site 6 (Thessaloniki Makedonomahon Square) is considerably higher than that of other case study site.

7. Conclusions

In this paper the influence of social, demographical, physical, behavioural and psychological factors on the sound preference evaluation has been investigated based on nineteen case study sites in Europe and China. The statistical analyses have been made for each case study site, allowing the examination of possible influence of cultural and geographical factors, by comparing different sites. In terms of social/demographical factors, the results suggest that age and education level are two factors which generally influence the sound preference significantly, although the influence may vary with different types of urban open spaces and sounds. It is interesting to note that with increasing age or education level, people tend to prefer natural sounds and are more annoyed by mechanical sounds although there are certain cultural differences. It has also been found that gender, occupation and residence status generally would not influence the sound preference evaluation significantly although gender has a rather strong influence for certain sound types such as bird sounds. In terms of physical, behavioural, and psychological factors, generally speaking, their influence on the sound preference evaluation is insignificant, except for a limited case study sites and certain sound types. Among these factors, the reason for coming to the site has been found influencing the sound preference evaluation least, and the site preference has been found most influencing. The influence of home sound environment on the sound preference has been found to be generally insignificant, except for certain sounds. For example, those people who hear bird sounds often at home may tend to prefer bird sounds in urban open spaces too.

It is noted that there are some correlations between social/demographical and physical/behavioural/psychological factors. Among those, the frequency of coming to the site and the site preference are more related to social/demographical factors.

In addition to contributing to a better understanding of influencing factors on the sound preference in urban open spaces, the results of this study are also important in determining the input variables for soundscape prediction models, for which the artificial neural networks techniques are being explored [30-32]. With such models the simultaneous effects of various factors can also be taken into account.

Acknowledgements

The data in this paper are mainly from two research projects, funded by the European Commission and the British Academy. The authors are indebted to the project partners for their permission of using the data, and to Dr. Mei Zhang and Dr. Wei Yang for useful discussion.

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List of Figure legends

Fig. 1. Mean difference between local and non-local residents in terms of the sound preference evaluation, considering all studied cases.

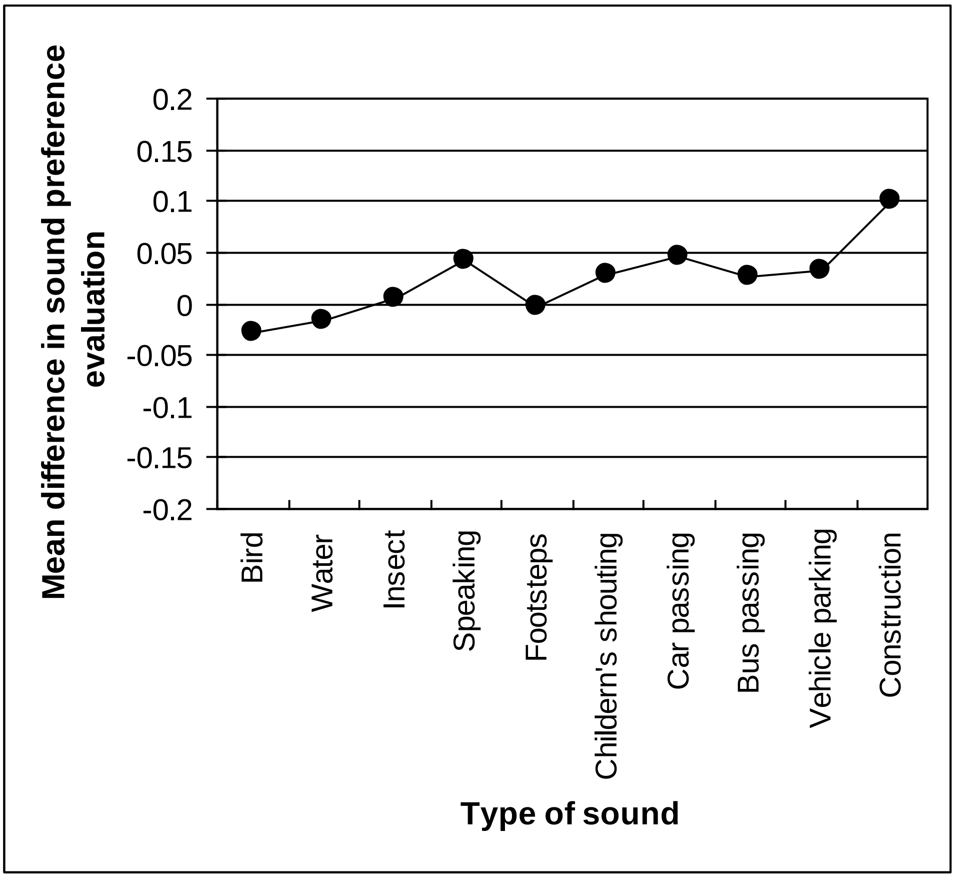

Fig. 1. Mean difference between local and non-local residents in terms of the sound preference evaluation, considering all studied cases.

Table 1
Factors studied and their categorisations and scales

Factors	Categorisation and scale
Season	1- winter; 2- autumn; 3- spring; 4- summer
Time of day	1- morning: 9.00am-11.59pm; 2- midday: 12.00-14.59pm; 3- afternoon:15.00-17.59pm; 4- evening:18.00-20.59pm; 5- night: 21.00pm-8.59am
Frequency of coming to the site	Scale 1-5: 1=first time; 5=every day
Reason for coming to the site	1- equipment/services of the site; 2- children playing and private meetings; 3- business/meeting/break; 4- attending social events; 5- passing by
Age	1: <12; 2: 12~17; 3: 18~24; 4: 25-34; 5: 35-44; 6: 45-54; 7: 55-64; 8: >65
Gender	1- male; 2- female
Occupation	1- students; 2- working people; 3- others (e.g. unemployed and pensioners)
Education level	1- primary; 2- secondary; 3- high level
Residential status	0- non local; 1- local
Site preference	0- do not like the site for certain reasons; 1- like the site
Home sound environment	Bird, insect, speaking, music, traffic

Table 2

Noticed sounds (marked by √) in the case study sites

		Natural sounds			Human sounds			Mechanical sounds				Instrumental sounds				
Site								Traffic				Music			Bell	
		Bird	Water	Insect	Speaking	Footstep	Children's shouting	Car	Bus	Parking	Construction	In open space	From stores	From passing car	Church	Clock
1	Bahnhofsplatz		√		√	√		√	√			√				
2	Florentiner				√	√		√				√				
3	Karaiskaki				√	√	√	√								
4	Seashore				√	√	√	√								
5	Kritis				√		√	√	√		√					
6	Makedonomahon						√	√	√		√					
7	IV Novembre		√		√			√	√							
8	Piazza Petazzi				√		√	√							√	
9	Jardin de Perolles	√			√		√	√								
10	Place de la Gare				√	√		√	√							
11	All Saint's Garden	√			√			√	√			√			√	
12	Silver Street		√		√	√		√	√							
13	Barkers Pool				√	√		√	√			√	√		√	√
14	Peace Gardens		√		√		√	√	√	√	√	√			√	√
15	Chang Chun Yuan Square	√		√	√			√	√			√				
16	Xi Dang Square			√	√	√		√	√	√			√			
17	Century Square				√	√		√	√							
18	Nanjing Road Square		√		√			√	√	√		√	√			√
19	Xu Jia Hui Park	√	√	√	√			√	√			√				

Table3
Sounds presented (marked by √) in the laboratory experiments

Stage	Single sounds											Combined sounds				
	Natural sounds			Human sounds			Mechanical sounds			Instrumental sounds						
	Bird	Water fall	Insect	Speaking	Children's shouting	Skateboard	Car & Bus passing	Traffic	Construction	Music in open space	Bells of church/clock	Traffic + Bird	Speaking + Bell	Fountain + Music	Fountain + Children's shouting	Fountain + Construction
Lab01	√		√	√	√	√		√	√	√	√					
Lab02	√				√		√	√				√	√			
Lab03		√				√								√	√	√

Table 4
Correlation coefficients between the sound preference evaluation of the studied natural sounds and age, occupation and education level; as well as mean differences between males and females, non-local and local residents, and students and working people (laboratory only). Marks * and ** indicate significant differences or correlations, with * representing $p<=0.05$ and ** representing $p<=0.01$. The results for site 2-6 and 8 are not included since all data are unavailable

	Bird					Water					Insect				
	Age	Gender	Occupation	Education	Residence	Age	Gender	Occupation	Education	Residence	Age	Gender	Occupation	Education	Residence
Site1						- 0.13	0.12	- 0.18(*)	0.01	0.04					
Site7						- 0.04	- 0.02	- 0.05	0.06	0.05					
Site9	- 0.22(**)	0.03	- 0.07(*)	- 0.08(*)	0.01										
Site10															
Site11	0.05	0.18(*)	- 0.13	- 0.26(**)	0.14										
Site12						0.00	- 0.03	- 0.09	0.01	0.02					
Site13	- 0.03	- 0.29(*)	- 0.12(**)	- 0.15(**)	0.13	- 0.02	0.24	- 0.15(*)	- 0.01	0.04	- 0.03	- 0.35(**)	- 0.14(**)	- 0.14(**)	0.02
Site14	0.06	- 0.45(**)	- 0.19(**)	- 0.01	- 0.18	0.10	- 0.40(**)	-0.12(*)	- 0.14(*)	- 0.09	0.07	- 0.45(**)	- 0.20(**)	- 0.02	0.04
Site15	- 0.13(*)	0.00	0.05	0.03	- 0.09	0.01	0.00	- 0.00	- 0.06	- 0.06	- 0.23(**)	0.02	0.03	0.01	- 0.16(*)
Site16	- 0.15(**)	- 0.03	0.05	- 0.13(*)	0.13(*)	- 0.00	- 0.02	- 0.03	- 0.06	0.07	- 0.16(**)	- 0.07	- 0.02	- 0.05	0.19(*)
Site17	- 0.27(*)	0.31(*)	- 0.33(*)	- 0.29(**)	- 0.18	- 0.32(**)	0.21	- 0.29(*)	- 0.52(**)	- 0.14	- 0.37(**)	0.26	- 0.32(*)	- 0.34(**)	- 0.06
Site18	- 0.10	0.22(*)	- 0.11	- 0.15	- 0.12	0.06	0.10	0.01	- 0.01	0.03	- 0.19	0.02	0.09	- 0.20	0.04
Site19	- 0.14	0.09	- 0.17	- 0.14	- 0.10	- 0.11	0.18(*)	0.12	- 0.22	- 0.12	- 0.17	0.18	0.12	- 0.06	- 0.04
Lab01	- 0.31(*)	- 0.26(*)	- 0.76	- 0.31(**)							- 0.21	- 0.06	0.21	- 0.18	
Lab02	- 0.35(*)	- 0.41(*)	0.32	- 0.29(*)											

Table 5
Correlation coefficients between the sound preference evaluation of the studied human sounds and age, occupation and education level; as well as mean differences between males and females, non-local and local residents, and students and working people (laboratory only)

	Speaking					Footsteps					Children's shouting				
	Age	Gender	Occupation	Education	Residence	Age	Gender	Occupation	Education	Residence	Age	Gender	Occupation	Education	Residence
Site1	0.01	- 0.08	0.07	- 0.01	0.03	0.01	- 0.03	- 0.05	- 0.21	0.22					
Site2	- 0.10	- 0.06	- 0.05	- 0.11	0.11	- 0.01	- 0.12	0.04	- 0.17	0.03					
Site3	- 0.18(**)	- 0.08(*)	- 0.09(*)	0.04	- 0.03	- 0.09(*)	- 0.04	- 0.04	0.04	- 0.05	- 0.28(**)	- 0.17(*)	- 0.14(**)	0.08	0.04
Site4	- 0.05	- 0.02	- 0.01	0.08(*)	0.05	- 0.02	- 0.06(*)	- 0.02	0.01	0.05	- 0.09(*)	0.06	- 0.08(*)	0.05	0.02
Site5	0.11	0.18	0.11	- 0.21(**)	0.33(*)						- 0.01	- 0.10	- 0.01	0.12(**)	- 0.19(*)
Site6											0.07(*)	- 0.04	0.08(*)	- 0.12(**)	- 0.04
Site7	- 0.08(*)	0.06	- 0.03	0.01	0.10(*)										
Site8	0.08	0.05	0.11(**)	- 0.10(*)	0.07						- 0.20(**)	0.24(**)	- 0.19(**)	0.03	0.07
Site9	- 0.06	0.04	0.01	- 0.09(*)	- 0.01						- 0.20(**)	0.06	- 0.16(**)	- 0.17(**)	0.02
Site10	0.09(*)	0.03	0.06	- 0.10(*)	0.04	0.04	- 0.05	0.07(*)	- 0.05	- 0.02					
Site11	- 0.14(**)	0.00	- 0.19(**)	- 0.00	0.00										
Site12	0.03	- 0.19(**)	0.12(*)	- 0.09	- 0.03	- 0.38(**)	- 0.20	- 0.08	0.44(**)	- 0.24					
Site13	0.03	- 0.29(*)	- 0.06	- 0.00	0.12	- 0.02	- 0.25(*)	- 0.12(*)	0.00	- 0.03	0.01	- 0.09	- 0.05	0.00	0.09
Site14	0.14(**)	- 0.29	- 0.02	- 0.05	0.01	- 0.10(*)	- 0.44(*)	0.01	0.18(**)	- 0.07	0.11(*)	- 0.25(*)	- 0.08	0.01	- 0.03
Site15	- 0.09	- 0.03	0.11	0.13(*)	0.02	- 0.09	- 0.04	0.14(*)	0.11(*)	- 0.05	- 0.01	0.03	0.00	0.09	0.06
Site16	- 0.12(*)	- 0.12	- 0.11	0.00	0.14	- 0.05	- 0.07	- 0.00	- 0.03	0.11	- 0.21(**)	- 0.09	- 0.06	- 0.02	0.23(**)
Site17	0.21	- 0.12	0.02	0.04	0.04	0.07	- 0.05	0.06	- 0.16	- 0.12	0.03	0.07	- 0.04	- 0.26	- 0.17
Site18	- 0.02	0.14	0.16	0.26(*)	- 0.34(**)	0.19	0.18	0.26(*)	0.33(**)	0.00	- 0.22	- 0.20	- 0.17	- 0.16	0.30
Site19	0.06	0.04	- 0.03	0.34(**)	0.10	0.07	- 0.17	0.11	0.24(*)	0.14	- 0.11	- 0.05	- 0.08	0.12	- 0.25
Lab01	- 0.03	0.16	0.24	0.04							- 0.24	- 0.07	0.02	- 0.19	
Lab02											- 0.09	- 0.08	- 0.00	0.10	

Table 6
Correlation coefficients between the sound preference evaluation of the studied mechanical sounds and age, occupation and education level; as well as mean differences between males and females, non-local and local residents, and students and working people (laboratory only)

	Car passing					Bus passing					Vehicle parking					Construction				
	Age	Gender	Occupation	Education	Residence	Age	Gender	Occupation	Education	Residence	Age	Gender	Occupation	Education	Residence	Age	Gender	Occupation	Education	Residence
Site1	- 0.03	- 0.08	0.03	0.16(**)	- 0.05	0.07	- 0.11	0.09	0.12	- 0.14										
Site2	- 0.09	- 0.13(*)	- 0.02	0.08	0.09															
Site3	0.11(*)	- 0.01	0.04	- 0.07	- 0.02															
Site4	0.05	- 0.09(**)	0.06	- 0.02	0.05															
Site5	- 0.05	0.01	0.03	- 0.03	0.23(**)	0.09(*)	0.01	0.02	- 0.04	- 0.01						- 0.05	0.11	0.05	- 0.08(*)	0.34(**)
Site6	- 0.05	0.08(**)	0.01	- 0.07(*)	0.09(**)	- 0.06	0.09(**)	0.01	- 0.08(*)	0.15(**)						0.00	0.07(*)	0.01	- 0.09(**)	0.12(**)
Site7	- 0.14(**)	- 0.03	- 0.13(**)	0.17(**)	- 0.04	- 0.11(**)	- 0.02	- 0.11(**)	0.17(**)	- 0.07										
Site8	- 0.01	- 0.04	0.01	- 0.01	0.07															
Site9	- 0.09(**)	- 0.05	- 0.11(**)	0.12(**)	- 0.04															
Site10	0.00	- 0.05	- 0.01	0.10(**)	0.01	- 0.11(**)	- 0.13(**)	- 0.08(**)	0.07(*)	- 0.02										
Site11	- 0.14(**)	- 0.05	- 0.08	0.01	0.18(**)	0.00	0.08	- 0.03	0.15	0.09										
Site12	- 0.13(**)	0.16(**)	- 0.00	0.13(**)	0.15(**)	- 0.07	0.12(*)	0.03	0.17(**)	0.28(**)										
Site13	0.13(**)	- 0.21(*)	0.02	0.13(**)	- 0.06	0.08	- 0.19(*)	- 0.02	0.13(**)	- 0.06	0.11(**)	- 0.21(*)	0.06	0.03	-0.06	0.01	- 0.29(*)	- 0.03	0.03	- 0.09
Site14	0.16(**)	- 0.27(*)	- 0.09	0.11(*)	- 0.03	0.13(**)	- 0.30(**)	- 0.11(*)	0.12(*)	0.01	0.17(**)	- 0.20(*)	0.07	0.10(*)	-0.04	0.13(*)	- 0.11	0.08	- 0.07	- 0.01
Site15	0.04	0.08	0.00	0.21(**)	0.11	0.03	0.01	0.02	0.14(*)	- 0.09	0.08	- 0.08	0.11	0.15(*)	0.06	0.08	0.02	- 0.01	0.23(**)	0.13(*)
Site16	- 0.11	- 0.01	- 0.09	0.20(**)	0.07	- 0.13(*)	0.04	- 0.08	0.15(**)	0.04	- 0.02	- 0.01	- 0.08	0.13(*)	0.08	- 0.05	0.05	- 0.05	0.15(*)	- 0.01
Site17	0.18	- 0.50(**)	0.20	0.28(*)	0.19	0.19	- 0.10	0.17	0.10	0.15	0.18	- 0.20	0.15	0.09	0.21	0.23	- 0.09	0.20	0.09	0.22
Site18	- 0.13	- 0.10	- 0.01	0.30(*)	- 0.03	- 0.06	- 0.08	- 0.09	0.04	0.08	0.07	- 0.05	0.10	0.11	-0.01	- 0.02	- 0.06	- 0.05	0.03	0.08
Site19	0.19	0.10	0.18	0.34(**)	- 0.09	0.06	0.10	0.01	0.33(**)	- 0.03	0.19	0.10	0.02	0.44(**)	0.06	0.06	- 0.08	- 0.12	0.28(**)	0.12
Lab01																0.18	- 0.11	- 0.06	0.27(*)	

Table 7
Percentage (number) of the studied cases where significant correlations or differences exist between sound preference and social/demographical factors

		Age	Gender	Occupation	Education	Residence
Natural sound	Bird	54.5% (6/11)	63.6% (7/11)	36.4% (4/11)	63.6% (7/11)	11.1% (1/9)
	Water	10.0% (1/10)	20.0% (2/10)	40.0% (4/10)	20.0% (2/10)	0.0% (0/10)
	Insect	37.5% (3/8)	25.0% (2/8)	37.5% (3/8)	25.0% (2/8)	28.6% (2/7)
Human sound	Speaking	31.6% (6/19)	15.8% (3/19)	21.1% (4/19)	42.1% (8/19)	16.7% (3/18)
	Footsteps	23.1% (3/13)	23.1% (3/13)	30.8% (4/13)	38.5% (5/13)	0.0% (0/13)
	Children's shouting	46.7% (7/15)	20.0% (3/15)	33.3% (5/15)	20.0% (3/15)	15.4% (2/13)
Mechanical sound	Car passing	36.8% (7/19)	36.8% (7/19)	10.5% (2/19)	68.2% (13/19)	21.1% (4/19)
	Bus passing	35.7% (5/14)	35.7% (5/14)	21.4% (3/14)	64.3% (9/14)	14.3% (2/14)
	Vehicle parking	28.6% (2/7)	28.6% (2/7)	0.0% (0/7)	57.1% (4/7)	0.0% (0/7)
	Construction	10.0% (1/10)	20.0% (2/10)	0.0% (0/10)	60.0% (6/10)	33.3% (3/9)

Table 8
Correlation coefficients between the sound preference evaluation and physical factors including season and time of day

Site	Nature sounds						Human sounds						Mechanical sounds							
	Bird		Water		Insect		Speaking		Footsteps		Children’s shouting		Car passing		Bus passing		Vehicle parking		Construction	
	Season	Time	Season	Time	Season	Time	Season	Time	Season	Time	Season	Time	Season	Time	Season	Time	Season	Time	Season	Time
1			0.02	- 0.05			- 0.27(*)	- 0.19	- 0.16	- 0.22			- 0.16(**)	0.04	- 0.12	- 0.08				
2							- 0.34(**)	0.08	- 0.23(*)	- 0.21			0.01	0.01						
3							0.03	- 0.02	0.08	- 0.03	0.04	0.01	- 0.10	0.03						
4							- 0.17(**)	0.07	0.20(**)	- 0.17(**)	- 0.06	0.05	- 0.15(**)	0.04						
5							0.76(**)	- 0.08			0.32(**)	- 0.08(*)	- 0.06	0.04	0.22(**)	- 0.10(*)			- 0.05	0.07(*)
6											0.29(**)	- 0.10(**)	- 0.23(**)	0.09(**)	- 0.22(**)	0.09(**)			- 0.23(**)	0.10(**)
7			- 0.11(**)	0.04			0.26(**)	- 0.01					0.02	- 0.02	- 0.02	0.05				
8							0.27(**)	- 0.18(**)			0.06	- 0.01	0.02	0.03						
9	- 0.02	0.12(**)					- 0.07	0.10(*)			0.02	0.14(**)	0.06	0.07(*)						
10							0.03	- 0.03	0.05	0.00			0.05	0.01	- 0.02	0.04				
11	0.15	0.12					- 0.04	- 0.08					- 0.29(**)	- 0.03	- 0.39	- 0.05				
12			0.14(**)	- 0.11			0.08	0.04	- 0.24(*)	0.10			- 0.07	- 0.09(*)	- 0.05	- 0.24(**)				
13	0.04	0.04	0.01	0.00	0.04	0.04	- 0.01	- 0.02	0.04	0.04	0.01	0.00	0.03	0.02	0.03	0.02	0.03	0.02	0.00	- 0.00
14	0.06	0.05	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	- 0.01	- 0.02	0.05	0.05	0.05	0.05	0.09(*)	0.08	0.03	0.02
15		0.01		- 0.06		0.05		- 0.00		0.02		0.03		- 0.08		- 0.02		- 0.08		- 0.06
16		0.03		- 0.02		0.03		0.01		0.01		- 0.06		- 0.02		- 0.02		0.08		- 0.03
17		- 0.06		- 0.05		0.00		0.03		0.16		- 0.01		0.14		- 0.03		- 0.02		0.07
18																				
19		0.07		0.02		0.03		0.03		- 0.13		- 0.15		- 0.02		- 0.14		- 0.11		- 0.06

Table 9
Correlation coefficients between the sound preference evaluation and the frequency of coming to the site and the reason for coming to the site; as well as the mean differences in sound preference evaluation between people who like and dislike the site (site preference)

Site	Nature sounds								Human sounds									Mechanical sounds											
	Bird			Water			Insect		Speaking			Footsteps			Children's shouting			Car passing			Bus passing			Vehicle parking			Construction		
	Frequency	Site preference	Reason	Frequency	Site preference	Reason	Frequency	Reason	Frequency	Site preference	Reason	Frequency	Site preference	Reason	Frequency	Site preference	Reason	Frequency	Site preference	Reason	Frequency	Site preference	Reason	Frequency	Site preference	Reason	Frequency	Site preference	Reason
1				0.12	0.13	- 0.04			- 0.06	0.16	0.06	- 0.03	0.08	0.10				- 0.02	- 0.09	- 0.06	- 0.10	- 0.16	0.02						
2									0.17(*)	0.02	0.04	0.15	0.13	0.00				- 0.06	- 0.24(**)	0.00									
3									0.11(*)	- 0.05	0.12(**)	0.02	0.02	0.04	- 0.1(**)	- 0.02	0.10(*)	- 0.01	0.05	0.00									
4									- 0.06	0.00	- 0.06	0.09(*)	0.00	- 0.02	- 0.04	- 0.09	0.00	0.00	- 0.07(*)	- 0.05									
5									0.23(**)	0.31(*)	- 0.07				0.00	0.16(**)	- 0.07	- 0.08(*)	- 0.03	0.13(**)	- 0.04	0.04	0.07				- 0.11(**)	0.00	0.10(**)
6															- 0.10(**)	0.26(**)	- 0.06	- 0.11(**)	- 0.03	- 0.11(**)	- 0.10(**)	- 0.02	- 0.12(**)				- 0.09(**)	- 0.07	- 0.14(**)
7				0.07	0.01	0.00			0.11(**)	0.04	- 0.03							0.06	- 0.24(**)	0.04	0.07	- 0.23(**)	- 0.01						
8									- 0.04	- 0.06	- 0.01				0.01	- 0.06	- 0.02	0.07	- 0.20(**)	- 0.09									
9	0.04	0.05	- 0.02						0.00	0.01	- 0.02				0.05	0.04	0.01	- 0.04	- 0.12(**)	- 0.03									
10									0.00	0.04	- 0.06	0.04	0.05	- 0.01				- 0.04	- 0.26(**)	0.07	0.01	- 0.20(**)	- 0.05						
11	0.18	- 0.10	0.00						- 0.06	0.16(*)	- 0.07							0.18(**)	- 0.21(**)	0.12(*)	0.21(**)	- 0.21(**)	0.28(**)						
12				0.07	0.04	0.03			0.06	- 0.10	0.17	0.11	- 0.33(**)	0.11				0.03	- 0.15(**)	0.08	0.08	- 0.09	0.10						
13									- 0.02	0.14	- 0.08	0.01	0.16	- 0.03				- 0.05	0.14	- 0.00	- 0.03	0.09	- 0.02						
14				0.14(**)	0.57(**)	0.04			0.11(**)	0.54(**)	0.08				0.10(*)	0.36(**)	0.03	0.07	0.31(**)	0.06	0.06	0.33(**)	0.04	0.09(*)	0.28(**)	0.07	0.06	0.28(**)	0.05
15	- 0.10		- 0.04				- 0.03	-0.04	- 0.05		0.03							0.02		0.06	0.03		0.07						
16							0.05	-0.17(**)	- 0.02		- 0.02	0.02		0.00				- 0.09		0.03	- 0.11		0.00	- 0.02		0.02			
17									0.01			- 0.09						- 0.23			- 0.14								
18				0.03					- 0.24(*)									- 0.15			- 0.06			- 0.04					
19	- 0.17			- 0.11			- 0.20		- 0.12									- 0.09			0.12								

Table 10
Percentage (number) of the case study sites where significant correlations or differences exist between sound preference and physical/behavioural/psychological factors

Sound		Season	Time of day	Frequency of coming to the site	Site preference	Reason for coming to the site
Natural	Bird	0.0% (0/4)	12.5% (1/8)	0.0% (0/4)	0.0% (0/2)	0.0% (0/3)
	Water	40.0% (2/5)	0.0% (0/9)	16.7% (1/6)	25.0% (1/4)	0.0% (0/4)
	Insect	0.0% (0/2)	0.0% (0/6)	0.0% (0/3)		50.0% (1/2)
Human	Speaking	46.2% (6/13)	11.8% (2/17)	33.3% (6/18)	23.1% (3/13)	6.7% (1/15)
	Footsteps	37.5% (3/8)	8.3% (1/12)	11.1% (1/9)	14.3% (1/7)	0.0% (0/8)
	Children's shouting	25.0% (2/8)	25.0% (3/12)	37.5% (3/8)	42.9% (3/7)	14.3% (1/7)
Mechanical	Car passing	28.6% (4/14)	16.7% (3/18)	15.8% (3/19)	64.3% (9/14)	18.8% (3/16)
	Bus passing	22.2% (2/9)	23.1% (3/13)	14.3% (2/14)	44.4% (4/9)	18.2% (2/11)
	Vehicle parking	50.0% (1/2)	0.0% (0/6)	33.3% (1/3)	100% (1/1)	0.0% (0/2)
	Construction	25.0% (1/4)	25.0% (2/8)	66.7% (2/3)	33.3% (1/3)	66.7% (2/3)

Table 11

Mean difference in sound preference of a given sound between people who hear the sound at home or not (No – Yes)

Site	Natural sounds		Human sounds	Mechanical sounds			Instrumental sounds		
	Bird	Insect	Speaking	Car passing	Bus passing	Vehicle parking	Music in open spaces	Music from passing car	Music in shop
15	0.10(*)	-0.09	0.16	-0.06	0.01	-0.08	0.16	0.20	0.18
16	0.10	0.12	0.07	-0.09	-0.04	-0.07	0.04	0.09	0.09
17	0.12		0.16	0.19	0.13	0.20	-0.15	-0.01	0.19
18	0.16		0.55	0.06	0.07	0.07	0.20	0.33(*)	0.40
19	0.19(*)		0.09	0.04	0.10	0.13	0.21	-0.47(*)	0.27
China (all sites)	0.10(**)	0.09	0.12(*)	-0.04	0.02	-0.02	0.09	0.12(*)	0.20(**)

Table 12

Relationships between social/demographical and physical/behavioural/psychological factors, based on the mean differences for the site preference, gender, and residence status and Pearson/Spearman correlations for other factors

Site	Age				Gender				Occupation				Education				Residence			
	Season	Time	Frequency	Site Preference	Season	Time	Frequency	Site Preference	Season	Time	Frequency	Site Preference	Season	Time	Frequency	Site Preference	Season	Time	Frequency	Site Preference
1	0.06	- 0.02	0.05	0.02	- 0.10	- 0.10	0.03	- 0.06	0.30	0.06	- 0.20 (**)	- 0.01	0.01	0.12(*)	- 0.08	-0.22(**)	0.15	- 0.17	- 0.62(**)	0.05
2	0.01	0.07	0.07	0.50(**)	- 0.05	0.17(*)	0.15	- 0.06	- 0.04	0.03	- 0.12(**)	0.22(**)	- 0.02	- 0.01	- 0.06	-0.10	0.16	- 0.18(*)	- 0.59(**)	0.04
3	0.00	0.19(**)	0.00	0.32(*)	- 0.03	0.19	0.31(**)	- 0.06	0.00	0.12(**)	0.00	0.05	0.10	- 0.01	0.23(**)	-0.20(**)	0.02	0.04	- 1.13(**)	- 0.09(*)
4	0.05	- 0.08(**)	0.27(**)	0.13	0.06	- 0.09	0.09	0.05	0.04	- 0.01	0.27(**)	0.14(**)	- 0.07	0.04	- 0.18(**)	-0.21(**)	0.27(**)	0.05	- 0.67(**)	0.02
5	0.00	- 0.12(**)	0.08(*)	- 0.16	- 0.08	- 0.04	0.16(**)	0.02	- 0.00	- 0.07	0.05	- 0.03	- 0.01	0.05	- 0.18(**)	-0.21(**)	0.04	0.02	- 0.19(**)	- 0.05
6	0.11(**)	- 0.09(**)	0.02	0.30(*)	- 0.18(**)	0.09	0.13(*)	- 0.10(**)	0.11(**)	- 0.09(**)	- 0.01	0.07	- 0.11(**)	0.02	- 0.04(*)	-0.19(**)	- 0.12	0.08	- 0.60(**)	- 0.01
7	0.02	- 0.16(**)	0.07	0.33(*)	- 0.20(*)	- 0.12	0.09	- 0.09(*)	0.07	- 0.19(**)	0.10(*)	0.17(**)	0.09(*)	0.12(**)	- 0.08(*)	-0.34(**)	0.12	0.38(**)	- 0.52(**)	- 0.02
8	0.00	- 0.05	0.06	0.12	- 0.03	0.01	- 0.14	0.00	0.08(*)	- 0.11(**)	0.16(**)	0.01	- 0.12(**)	0.04	- 0.18(**)	-0.14(**)	- 0.24	0.33(**)	- 0.94(**)	- 0.03
9	- 0.16(**)	- 0.17(**)	0.04	0.33(**)	0.03	0.06(**)	0.01	- 0.11 (**)	- 0.11(**)	- 0.18(**)	0.02	0.10(*)	- 0.05	- 0.05	- 0.13(**)	-0.18(**)	0.15	0.34(**)	- 0.72(**)	0.01
10	0.02	- 0.16(**)	- 0.23(**)	- 0.19	- 0.14(*)	0.07	- 0.02	- 0.05	0.03	- 0.14(**)	- 0.27(**)	0.00	- 0.03	- 0.04	0.03	-0.13(**)	0.03	0.03	- 0.64(**)	- 0.12(**)
11	0.20(**)	- 0.04	- 0.19(**)	0.36(*)	0.07	- 0.17	0.10	0.00	0.06	0.04	- 0.11(*)	0.15(*)	0.02	- 0.04	- 0.05	-0.05	0.31(**)	0.11	- 1.17(**)	- 0.13(**)
12	0.08	0.00	- 0.30(**)	0.27	0.02	- 0.15	0.09	0.08	- 0.11(*)	- 0.09(*)	- 0.27(**)	0.05	- 0.01	- 0.07	0.05	-0.16(**)	0.54(**)	0.05	- 1.19(**)	- 0.08(*)
13	- 0.12(**)	- 0.14(*)	- 0.22(**)	- 0.10	0.01	- 0.11	0.19(*)	0.09	- 0.05	- 0.06	- 0.06	- 0.01	0.04	0.04	- 0.12(*)	-0.09	- 0.01	0.23	- 0.23	- 0.12(*)
14	- 0.03	- 0.03	- 0.16(**)	0.59(*)	- 0.22(*)	- 2.26(*)	0.15	0.06	- 0.06	- 0.05	- 0.12(**)	1.94(**)	0.03	0.03	- 0.00	-0.11(*)	0.05	0.50	- 0.65(**)	- 0.01
15		- 0.32(**)	0.31(**)			- 0.26	- 0.26			0.10	- 0.10			0.01	0.05			0.58(**)	- 0.68(**)	
16		- 0.10	- 0.06			0.21	- 0.03			- 0.01	0.09			- 0.15(**)	- 0.13(*)			- 0.47	- 0.64(**)	
17		0.02	- 0.17			- 0.22	0.46			- 0.04	- 0.29(*)			0.18	- 0.19			- 0.36	0.32	
18			- 0.36(**)				- 0.01				- 0.21				- 0.32(**)				- 1.42(**)	
19		- 0.28(*)	0.20			0.20	- 0.41			- 0.11	0.12			0.09	- 0.23			0.17	- 0.43	

Table 13
Percentage (number) of the case study sites where significant correlations or differences exist between social/demographical factors and physical/behavioural/psychological factors

	Season	Time of day	Frequency of coming to the site	Site preference
Age	28.6% (4/14)	55.6% (10/18)	47.4% (9/19)	50.0% (7/14)
Gender	28.6% (4/14)	16.7% (3/18)	21.1% (4/19)	21.4% (3/14)
Occupation	28.6% (4/14)	38.9% (7/18)	52.6% (10/19)	42.9% (6/14)
Education	21.4% (3/14)	11.1% (2/18)	52.6% (10/19)	78.6% (11/14)
Residence	21.4% (3/14)	27.8% (5/18)	84.2% (16/19)	35.7% (5/14)

Table 14

Summary of the relationships among sound preference, physical/behavioural/psychological factors, and social/demographical factors, where the white areas indicate that the factors have been investigated in the case study sites, the dotted areas indicate that significant influences of physical/behavioural/psychological factors have been found, and the dotted areas with letters (A, age; G, gender; O, occupation; E, education level; R, residence) indicate that significant influences of both social/demographical factors and physical/behavioural/psychological factors have been found

Site	Nature sounds												Human sounds												Mechanical sounds															
	Bird				Water				Insect				Speaking				Footsteps				Children's shouting				Car passing				Bus passing				Vehicle parking				Construction			
	Season	Time	Frequency	Site preference	Season	Time	Frequency	Site preference	Season	Time	Frequency	Site preference	Season	Time	Frequency	Site preference	Season	Time	Frequency	Site preference	Season	Time	Frequency	Site preference	Season	Time	Frequency	Site preference	Season	Time	Frequency	Site preference	Season	Time	Frequency	Site preference	Season	Time	Frequency	Site preference
1																																								
2																																								
3															G								G																	
4																																								
5															E,R	E								E			R			A									E,R	
6																					A,O,E	A,O	E	A,E	G,E		G,E,R		G,E		G,E,R						G,E		G,E,R	
7															R													A,O,E				A,O,E								
8													O,E	O																										
9		A,O																				A,O				A,O		A,O,E												
10																												E				E								
11																A,O									A,R		A,R	A,R												
12																				E								E,R												
13																																								
14								E								E							A	A,E				A				A	G		A	A				A
15																																								
16																																								
17																																								
18															E,R																									
19																																								

***Detailed Response to Reviewers**

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8th December 2009

Dear Prof. Lam, dear colleagues,

APAC-D-08-00053 – 2nd Revision
Factors Influencing the Sound Preference in Urban Open Spaces
Lei Yu, Jang Kang

We greatly appreciate the further comments/suggestions given by Reviewer 2. Modifications have been made accordingly.

The main problem with your excellent data set which required for sure an enormous work ! BUT STILL: it is NOT possible to mix up people from different cultural back grounds with different meanings about sounds in "ONE scale". My recommendation is to bring all data related to the different cultural backgrounds. Then: you might find some essential information!!! AFTER that you should COMPARE the judges etc.

While all the analyses (as shown in the tables) were already made based on individual sites, allowing the examination of cultural differences, in the revised manuscript, more analyses/comparisons have been added wherever possible/appropriate, on the differences between different cultures (i.e. different cities and countries), in terms of various factors. The importance of cultural differences has also been further emphasised.

(from the editor) Fortunately this time the reviewer has made the comment more specific. Also, I can elaborate the comment a bit further. The reviewer is concerned that the paper is dealing with sociological theories without taking into account the sociology itself. The paper finds some results with respect to age and gender, but missing is the real relevant explanation. The main problem is that data from people from different cultures cannot be brought together simply in the the same scale. So, the recommendation is that extra analysis should be done for each culture. You can then try to find comparability in behavior etc. Data from all over the world should not be treated in an overall manner.

During the course of research, we always had sociologists in the team, and they also had considerable input in the questionnaire designs etc. The questionnaires in each country was translated and dealt with by native speakers.

More explanations have been added regarding the results with respect to age and gender.

As mentioned above, the statistical analyses were made for each case study site, allowing the examination of possible influence of cultural and geographical factors, through comparing different sites wherever possible/appropriate.

Yours sincerely

Jian Kang and Lei Yu