

UNIVERSIDAD POLITECNICA DE VALENCIA  
ESCUELA POLITECNICA SUPERIOR DE GANDIA  
Master en Ingeniería Acústica

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## Soundscape analysis in two parks in Berlin

***Master Thesis***

Author:

***Natalia Manrique Ortiz***

Supervisors:

***Prof. Dr. Brigitte Schulte - Fortkamp***

***Prof. Dr. Víctor Espinosa Roselló***

***Berlin, 21 August 2013***

# Exchange program between the Universidad Politécnica de Valencia and the Technische Universität Berlin.

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I, Natalia Manrique Ortiz, declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institute of tertiary education. Information derived from the published and unpublished work of others has been acknowledged in the text and a list of references is given in the bibliography.

Berlin, 21 of August 2013

## Abstract

Nowadays the protection of quiet areas is an issue of increasing importance. This importance is reflected in the European directives (1) and policy intentions of many countries around the world. In order to protect these areas, it is important to characterize their soundscapes in all their complexities and analyze the areas, paying special attention to the geography, aesthetics, social, psychological and cultural aspects, since these aspects play a significant role in the noise perception.

A detailed soundscape analysis was performed in two parks in Berlin, with a completely different surrounding atmosphere each. On the one hand, Treptower Park is located in Alt-Treptow district and next to the districts Friedrichschein-Kreuzberg and Neukoeln, an area which is well-known for its young, multicultural and party-friendly atmosphere and on the other hand, Schlosspark is located in Charlottenburg district, an area known for its familiar and cultural atmosphere. In order to analyze the soundscape of both areas, narrative interviews, soundwalks and binaural recordings were carried out. During the analysis of the data much incoherence between the comments about annoyance given during the narrative interviews and the soundwalks, and the sound pressure level were found. It is concluded that the SPL is a good parameter for having a first impression of the place under study but doesn't reflect the quality of the soundscape, for that reason further research is needed to classify a zone as "quiet".

Besides, the study shows the importance of working together with experts in the field of research.

## Key Words

Psychoacoustics; Quality of life; Soundscape; Soundwalk; Quiet area;

## **Acknowledgement**

The author wishes to thank several people. I would like to thank my parents and family, for their endless patience, love and support they have shown during the past one and half years it has taken me to finalize this thesis. Furthermore I would also like to thank my friends who have been a great support during this time, a special thanks to Indra, Anabel and Fabio for coming with me to do interviews, to my colleagues of the “Soundscape and community noise” course for doing with me the soundwalks and being the experts in the experiments carried out for this thesis, also to Thomas, Monika, Julia, Jessica and Hector for helping me with the German transcriptions and English corrections. Special thanks to Kay Voigt for his assistance and guidance, without him and his fresh ideas everything would have been more complicated or even impossible. I would like to Professor Antonio Pérez López and Professor Víctor Espinosa Roselló to bring me into contact with the Professor Brigitte Schulte-Fortkamp. Last but not least, I would like to thank my supervisor Professor Brigitte Schulte-Fortkamp for encouraging me during the last year, and show me that there are infinite possibilities out there in the acoustician world.

### **Presence in congress and Awards**

Part of this thesis has been presented and published in the international congress 164th ASA meeting in Kansas city 2012 and in the AIA-DAGA Merano 2013. It has been chosen to appear in the e-book *COST Action TD0804 - Soundscape of European Cities and Landscapes* (Bibliography number 19).

Besides it has been awarded by one of the DEGA Travel Grants and a DEGA Student Grant.

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## State of the art

### Soundscape

For many years, acousticians have been concerned with noise annoyance. Many research studies have been done using different academic approaches and social and political actions have been taken.

The first approach to fighting against noise pollution that creates noise annoyance was to study the noise source, how long, where, when, how it happens? The common questions have been studied by the experts, but basically these studies are based in sound pressure levels. The experts elaborate noise maps from the cities and the government takes measures to decrease the sound pressure level in the places where the level is over the maximum level allowed by the laws, but this physical descriptors have shown their limits in explaining the subjective impression of acoustic phenomena (2) (3). Nevertheless, this approach is commonly accepted by society in our days and is recommended by the environmental laws all over the world.

In 1977, Murray Schafer, in his book “The Soundscape: Our Sonic Environment and the Tuning of the World” completely changed the way of understanding the noise annoyance issue. His concept of soundscape encapsulates not only the sound sources but also the subjective interpretation of each individual person who is part of the soundscape. Schafer also introduces the idea of using an interdisciplinary approach to understanding the complexity of the soundscape in its totality, considering the ambivalence of noise and its effects (accepting its possible positive effects e.g. music, security alarms).

*“The home territory of soundscape studies will be the middle ground between science, society and the arts. From acoustics and psychoacoustics we will learn about the physical properties of sound and the way sound is interpreted by the human brain. From society we will learn how man behaves with sounds and how sounds affect and change his behavior. From the arts, particularly music, we will learn how man creates ideal soundscapes for that other life, the life of the imagination and psychic reflection. From these studies we will begin to lay the foundation of a new interdiscipline – Acoustic Design.*

*...This study would consist of documenting important features, of noting differences, parallels and trends, of collecting sounds threatened with extinction of studying the effects of new sounds before they are indiscriminately released into the environment, of studying the rich symbolism sounds have for man and of studying human behavior patterns in different sonic environments in order to use these insights in planning future environments for man.” (4)*

Since 1977, the soundscape approach has been increasing significance in the scientific community, several studies have been done specially applied to the subject of study in this master thesis: quiet areas.

The definition of soundscape is more precise:

*“Soundscape suggest exploring noise in its complexity and its ambivalence. Soundscape research does not conceive noise per se but reconceives the conditions and purposes of its production, perception, evolution, which account for a human- centered point of view.*



*Soundscape forces you to think of the ambivalence of noise and noise effects, whether noise has only negative implications or whether there is something less than only annoyance in communities and something more concerning sound quality of residential ones.” (5)*

## **Interdisciplinary field**

Because of the complexity of soundscape, it has to be an interdisciplinary field; several studies have encouraged the experts to co-work with professionals with different backgrounds, such as acoustics, physics, psychology, medicine and sociology among others (6) (7). Some examples of research where different perspectives were needed to reach the aim of the study.

In order to design interactive soundscape, it is important to analyze the soundscape from a sociological perspective to define the relationship between sound and perception, seeing that sound is an inherent physical concept, it is intrusive, even when the person is not focusing on the sound, subconsciously continuing to hear it (8). For example, it has been observed that lower background sound level make people feel quieter, and make them behave quieter (9) (10).

The importance of enabling the access to quiet areas to the population has been increased because of its restoring properties; many studies have shown clear connection between noise annoyance and pleasantness with physiological responses as heart rate, respiratory rate and forehead electromyography (11) (12) (13) (14).

One of the best examples of co-working is the Nauener Platz project, where a conflictive square in north Berlin was changed into a nice and welcoming place. Several experts with different backgrounds worked together with the local expertise in this project: Sociologist, acousticians, architects and designers, changing the soundscape and with it the usability of the place (15).

From a psychological approach, it has been observed that changes in the soundscape can be associated with changes in body language and in behavior (16) (17).

## **Standardization**

One of the most important tasks when creating a new scientific approach is standardization, in order to create a common language of concepts and terms between all the fields of practice, different approaches and different disciplinary interests which are included in Soundscape. For that reason the Working Group of ISO/TC 43/SC 1 was established to begin consideration of a standardized method for assessment of soundscape quality outdoors (18)

Parallel to all the ISO Working Groups, was the TUD Action TD 0804: Soundscape of European Cities and Landscapes. It was a group of International Experts, from different approaches, involved with Soundscape (19) (20).

The aim of this group was:

*“The main aim of the Action is to provide the underpinning science for soundscape research and make the field go significantly beyond the current state-of-the-art, through coordinated international and interdisciplinary efforts. The Action will promote soundscape into current legislations, policies and practice, aiming at improving/preserving our sonic environment.” (21)*

In order to accomplish a high level of comparability between studies about noise annoyance they decided to use social surveys as tool and the standard ISO/TS 15666:2003 was developed, which provides specifications for socio-acoustic surveys and social surveys which include questions on noise effects (briefly referred to hereafter as "social surveys"). Its scope includes questions to be asked, response scales, key aspects of conducting the survey, and reporting the results. (22)

Nowadays, the Work Group "ISO/TC 43/SC 1/WG 54", a group of experts from all around the world continues to work on developing new standards.

Among the future outcomes of this group are:

- Provide minimum specifications for soundscape studies
  - Methods to assess perception/experience
  - Taxonomy and identification of specific acoustic events
  - Physical measurement: recording and analysis
  - Modeling, mapping and simulation methods
  - Soundscape design methods
  - Examples of applications
- Standard(s) will primarily be intended for researchers and public users evaluating soundscape quality
- Standard(s) will include definitions, methods, measurements and reporting requirements (23)

## Aim

One of the goals of this study is to know how the acoustic quality in quiet areas can be measured. The EU Environmental noise policies (1) are focused on reducing the sound pressure level, but it is well known that a soundscape with low SPL does not imply a high acoustic quality environment. It appears essential to consider not only acoustical and psycho-acoustical parameters as sound pressure level, loudness, roughness etc, but also to give more importance to the human perception, taking different approaches such as anthropologic, psychological, medical, etc. into account in order to have a detailed perspective on the area under study. Only when taking into account all these different approaches it is possible to value the acoustic quality of a place or area.

This study gives an approach to which factors are important for improving the sound quality of life related with quiet zones, showing different methods to analyze the data. Besides, a characterization of the soundscape in the urban parks under research has been carried out.

## Parks

Berlin is well known as the capital city of Germany, and one of the centers of culture, art and fashion. For 20 years the city was divided in two parts by the Berliner Wall, East and West, with different economical and political systems, which gave the folk different ways of being. Such a strong difference between people from the same city, gives the possibility to analyze the way how communities with different backgrounds perceive sound.

With more than a third of its area covered with forest, lakes, rivers and green areas, Berlin is placed in the top ten of the greener capitals of Europe according to the study European Green City Index, carried out by the Economist Intelligence Unit. (24)

The protection and preservation of these areas (quiet areas in agglomerations) is a very important issue because in these places people can temporarily recover their health from the harmful effects to the noise pollution of the city (14); this motivation is reflected in the Directive 2002/49/EG of the European Parliament and Council of June 25th 2002 (1) regarding the assessment and management of environmental noise. This directive expresses the need to preserve such areas:

*“...the need to apply the principle of prevention in order to preserve quiet areas in agglomerations”*

*“Quiet areas in agglomerations: shall mean an area, delimited by the competent authority, for instance which is not exposed to a value of  $L_{den}$  of another appropriate noise indicator greater than a certain value set by the Member State from any noise source”*

Regarding the importance of protecting such areas in Berlin, a noise reduction plan has been approved in 2008 (25). In this directive, the areas are separated into:

**Quiet areas in agglomerations according to the Environmental Noise Directive:** *Are large continuous green areas that allows to sojourning and also long walks without crossing noisy areas.*

**Urban recreation areas** *that not necessarily have low noise levels, but possess a high sojourn quality in the neighborhood of the dwelling locations, and are large enough so that their core is considerably quieter than its periphery.*

	Quiet Areas (Continuous Open Areas)	Urban Recreation Areas
Characteristic	Forest, green spaces, parks, fields, farmland and meadows. A continuous natural expanse connected with green spaces in the neighbouring landscapes	Green areas and recreation areas near residential areas within walking distance
Absolute limit level value <sup>106</sup>	$L_{den} \leq 55$ dB(A)	--
Relative limit level value	--	-6 dB(A) in the core area in relation to the most exposed area
Limit value of extension	$\geq 100$ ha	$\geq 30$ ha

**Table 1: Criteria for selection: differences between quiet Areas and Urban Recreation Areas. This table has been extracted from the Action Plan of the city of Berlin. All rights reserved.**

But even when several studies and directives show the importance of protecting urban recreation areas, the Berlin directive doesn't include any urban plan to protect such areas. The city government claims

Protecting this areas “don’t make sense, because it is always necessary to balance the protection of quiet areas against the protection of the population from noise.” (25)

Regarding this Master Thesis, the parks used for this study have been chosen taking in account the follow parameters:

- Different neighborhoods
- Similar size
- Near to a touristic attraction
- Beloved and used by the Berliners
- Close to the water
- Easy to reach by public transport
- Urban recreation areas

The Parks chosen to realize this study are:

Schlosspark Charlottenburg [1]

Treptower Park. [2]

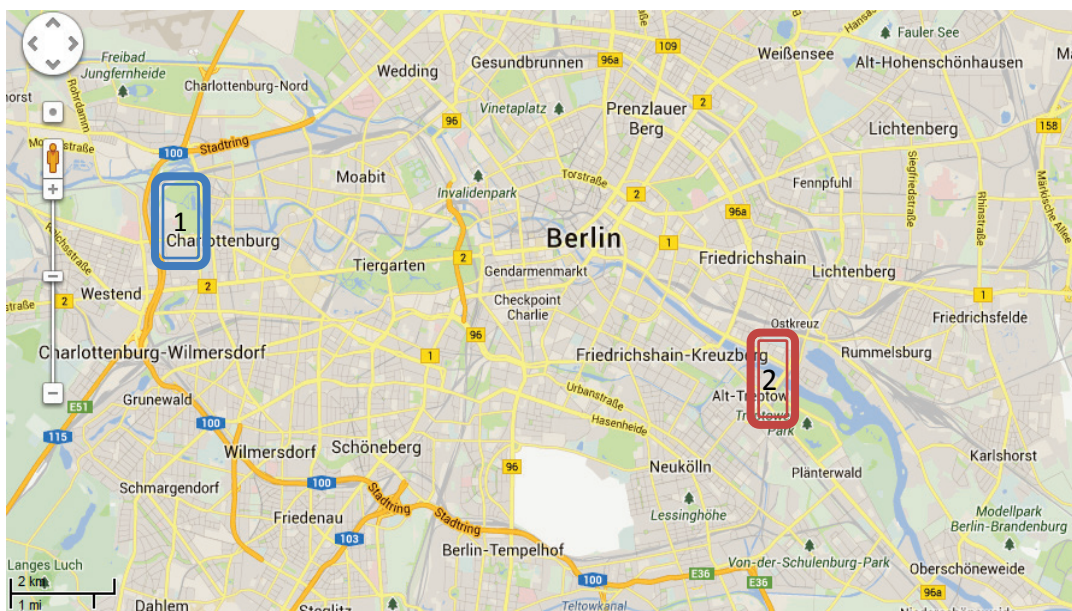


Figure 1: Map of Berlin. Google ©

## Schlosspark Charlottenburg

It is a park located in the district of the Charlottenburg-Wilmersdorf borough, in the west part of the city. After World War II this district was the center of West Berlin with many restaurants, shopping areas, hotels, theaters, operas and museums, but after the reunification the center of Berlin was reestablished in Mitte (city center), removing this area from the spotlight. Nevertheless, many important theaters, operas and museums are still in this part of the city as well as the Technische Universität Berlin, and the University of Arts, giving to this part of the city a familiar atmosphere with a lot of cultural offers.

The castle, the English Garden and the mausoleum are the main tourist attractions , but the informal park behind the English Garden is used generally by Berliners, for reading, jogging, having a walk, or simply relaxing. The areas used by the locals and by the tourists are clearly separated. In the figure that follows,

the zone used by the locals has been shaded using the color blue and the red shaded zone is used commonly only tourists.

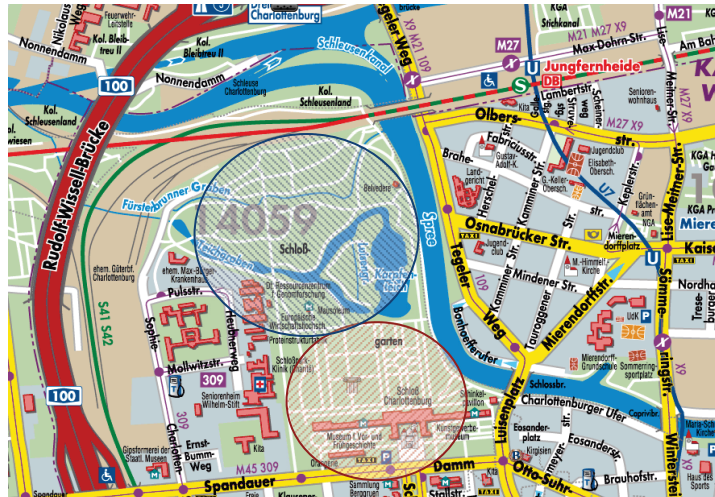


Figure 2: Schlosspark Charlottenburg, Tourists and local zones.  
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The most significant noise sources in Schlosspark are the highway A100 (deep red), the train ring line (green), the underground line (blue), the regional train line (red), the streets Osnarbrücke and Tegeler Weg (Yellow) and the International airport of Berlin, Tegel (doesn't appear in the map), located 4km in the northwest direction from the park.

This noise sources can be clearly identified in the noise map of the city (figure 3).

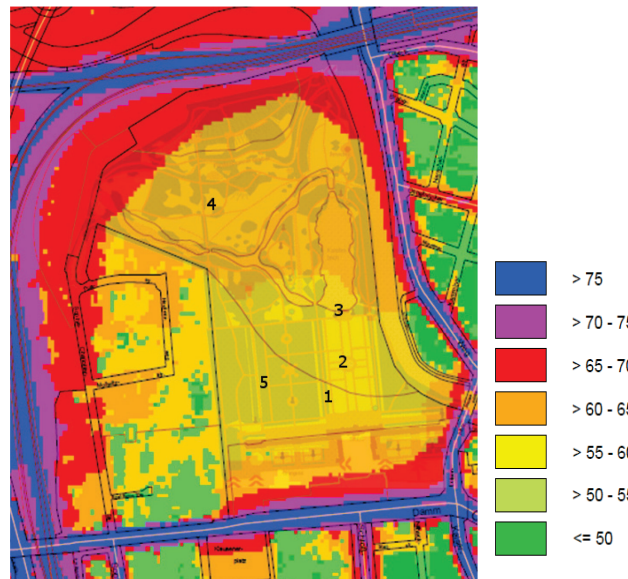


Figure 3: Official Noise Map of Schloss Charlottenburg with SPL scale.

The places pointed by numbers in the map (figure 3), were the stops done during the soundwalk. These stops were chosen by the participants following minor instructions (explained in the chapter: "Procedure: Soundwalk recordings")

### Treptower Park

Treptower Park is located in the district Treptow-Köpenick, on the east side of the city. Treptower Park was built between 1876 and 1888 along the Spree bank for 4km, covering an area of 88 hectares.

The area is surrounded by the districts Friedrichschain – Kreuzberg and Neuköln, all of them well known for their multicultural and young atmosphere. During the last years these districts have experienced a process of gentrification, which gives more information about how this area is and the people that live around it.

At the entrance of the park the pier from which the tour boats can be taken for a tour route through the city is located. The Soviet war memorial is another attractive point for tourists placed inside the park; this area is delimited by a fence.

The areas used by the locals and by the tourists are clearly separated. In the figure that follows, the zone used by the locals has been shaded using the color blue and the red shaded zone is used commonly only by tourists.



Figure 4: Map of Treptower Park with the zones used commonly by the tourists and by the locals. © Copyright Euro-Cities AG und 2013 Microsoft.

The principal noise sources of the park are the pier in the north, the circle train line on the west side, the Am Treptower Park road in the North, the Bulgarische street in the east and the Puschkin Avenue, which divides the park into two parts. Another noise source is the airport, 14km to the southeast. Even though the planes can be heard in the park, this source doesn't have as big an impact as the other sources named before.

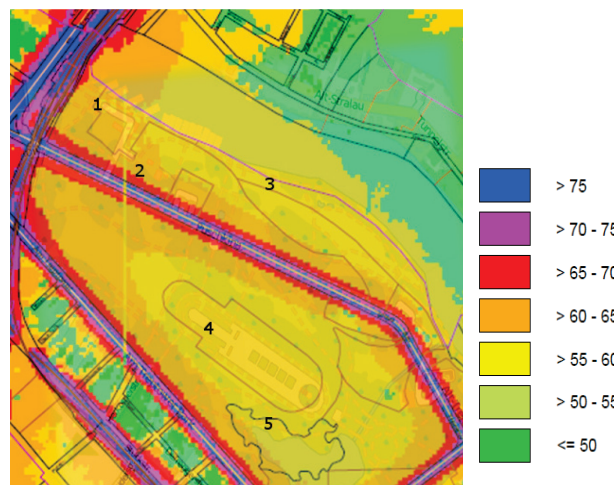


Figure 5: Official noise map of Treptower Park, with SPL scale.

The places pointed by numbers in the map (Figure 5) were the stops done during the soundwalk. These stops were chosen by the participants following minor instructions (explained in the chapter: “Procedure: Soundwalk recordings”).

## Procedure

A soundscape is a complex system influenced by several sources, and is perceived in a different way by each subject. Due to the complexity of the soundscape evaluation, narrative interviews, soundwalk questionnaires and soundwalk recordings have been performed as follow; the procedure taken is based on the previous studies of the professors Schulte-Fortkamp, Doctor Young, Professor Genuit, Dipl. Fiebig and the Dipl. Voigt (26) (27) (28) (29).

## Narrative interviews

An open questionnaire has been developed just as a guide during the narrative interview (APPENDIX I). The questionnaire has three parts: the first part where the interviewee is asked about his/her personal data, the second part where he/her is asked about the park itself, asking general questions about the park and not only about acoustics. And the third part that asks about presence of noise in the interviewee’s life. All the questions, except for one, are open questions, where the interviewee can use his own words to give an answer.

The interview is foreseen for 10 minutes, 15 interviews were carried out in each park with visitors that were spontaneously asked for free collaboration. People from both sexes between 12 and 90 years old were asked.

The interviewees were asked about their preference of language at the beginning of the interview. English, German, Spanish and Catalan were offered as possible languages for the interview. The interviews were done by the author of this thesis and a native German speaker companion, for security and German-language-issues reasons.

The collaborators were informed about the research before the interview started, and were asked about the possibility of recording the interview.

## Soundwalk questionnaire

Two soundwalks were carried out, one in each park with five measuring points (APPENDIX II). The measuring points are shown in the Figure 3 and in the Figure 5. Four experts with soundscape knowledge were involved in both soundwalks, all of them were regular visitors of Treptower Park, and attending the course Soundscape and community noise in TU Berlin. After each measuring point a short questionnaire was given to the experts. The questions were based on the comments from the narrative interviews.

The questionnaire had three different parts: During the first part the experts had to answer questions like “Wie laut ist es hier?” (How loud is it here?) , “Wie unangenehm ist es hier?” (How unpleasant is it here?) and a list of questions with the same structure as before, but with other adjective more related to feelings and visual incomes. The answer to these questions was given according to a scale as it’s shown below.



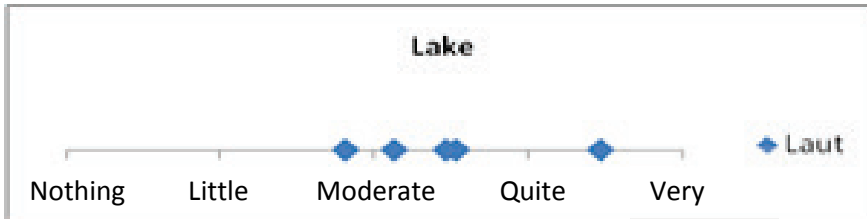


Figure 6: Answers to the question "how loud is here?" in the Lake in Treptower Park

In the second part, an open narrative question was asked, "Was mir jetzt gerade durch den Kopf geht..." (Going through my mind...), and the experts were asked about the sound sources they could recognize at each measuring point during the third part of the questionnaire.

The questionnaire was presented in English and German, with the possibility to be translated in to Spanish in situ, giving the experts the possibility to use the language they feel most comfortable with.

Other characteristics of the soundwalk, such as the view (watching the lake or the path or both) and position (lying down on the grass, standing up, etc.) were decided through an agreement by the participants during the soundwalk. The only rule they had to follow was that everybody had to be in the same position and with the same view.



Figure 7: View and position of the participants at the measuring point in front of the Lake in Schlosspark during the Soundwalk

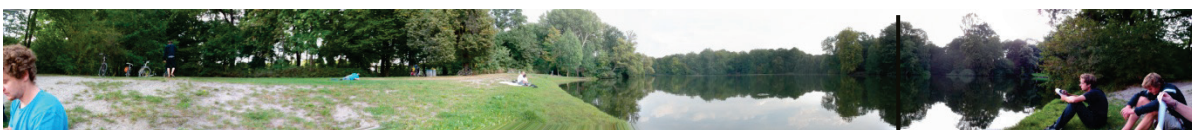


Figure 8: Panoramic view of the measuring point in front of the lake in Treptower Park during the soundwalk, the black line shows where the view direction of the measuring point is

The exact place from where to carry out the interview was chosen by the experts. A map with five different marked areas (similar to the one shown in the Figure 9 ) was given to the participants, and they decided where they wanted to go.

The soundwalk in Schlosspark was done walking but regarding the distances between the measure points in Treptower Park, and the limited time, it was decided to use the bike to go between different measure points.



Figure 9: Treptower Park with the measure points areas marked.

## Soundwalk recordings

During the Soundwalk, five binaural recordings of 2 minutes length, one for each measurement point, have been recorded in each park .

The binaural recordings have been recorded using the SQuadriga, a mobile four-channel USB frontend and its binaural headphones like the ones shown in Figure 10. After recording, the data have been analyzed with Artemis.

FFT, sound pressure level, roughness, loudness and sharpness have been calculated and compared.



**Figure 10: SQadriga and binaural microphones**

## Results

To know the differences between the answers of all the expertise, the data collected during the soundwalk was introduced in a statistics program and presented in a dendrogram as follows:

5 expertise	5 measurement places				
	1	6	11	16	21
2	7	12	17	22	
3	8	13	18	23	
4	9	14	19	24	
5	10	15	20	25	

Table 2: Relation between expertise's answers and measuring points. In red are the answers given by the author of this thesis

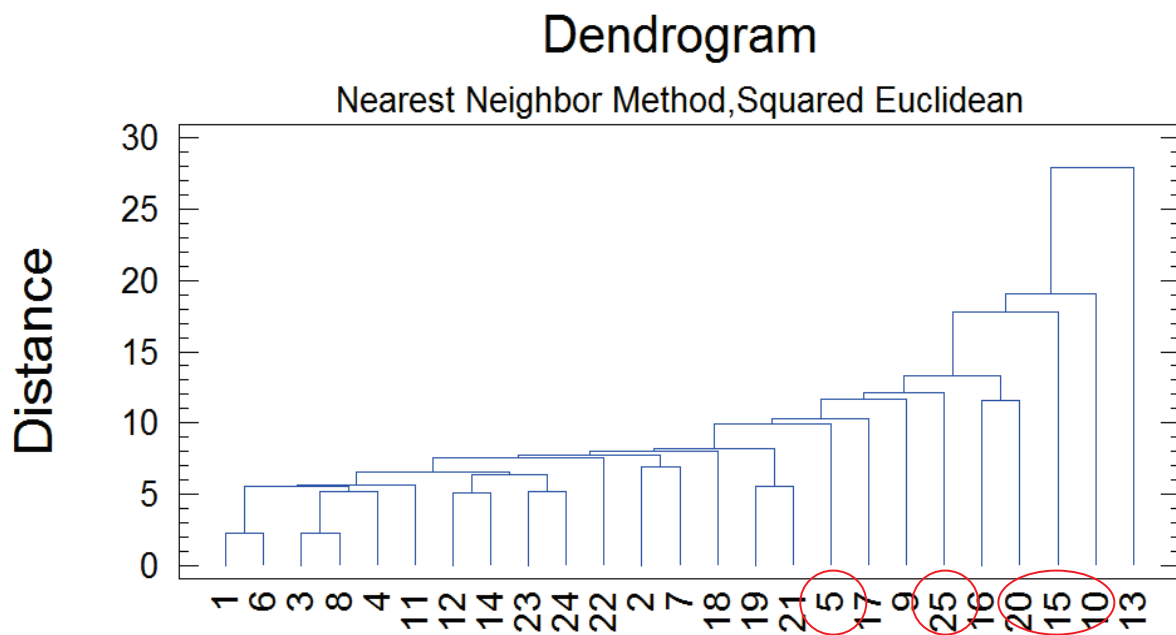
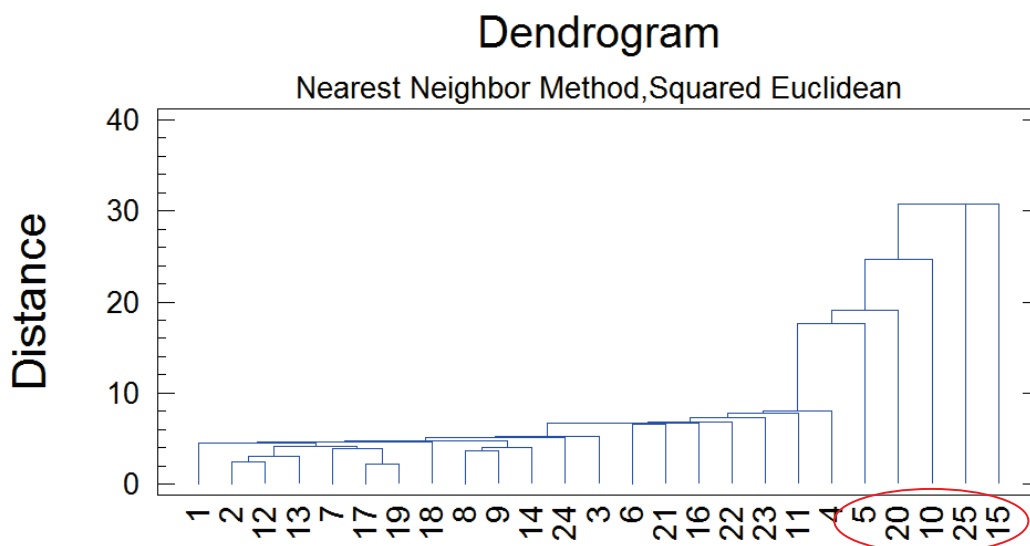


Figure 11: Dendrogram of answers given during the soundwalk in Schlosspark.



**Figure 12: Dendrogram of answers given during the soundwalk in Treptower Park.**

Both dendrograms show that there is an abnormality with the answers of the expertise number 5 (author's thesis), that could have happened due to the focus in the technical part of the soundwalk rather than in the soundscape. For that reason the answers of this expertise have not been taken into account in order to analyze the data for this thesis.

The dendrograms also show how the distance between the answers given is bigger when the expertises aren't familiarized with the park.

#### **Correlation Matrices**

The analysis with the correlation matrices (APPENDIX III) shows clear differences of how the expertises perceived the soundscape in both parks.

A high correlation ( $r= 0.8-0.9$ ) in the measuring points in Treptower park exist between the variable noise annoyance and the variable loudness, but very low correlation in the measuring points in Schlosspark. That could be due to the expectation of the expertise in the park that they knew before (Treptower park), and the fact that they were this time focused only in the soundscape without doing another task, as usually they did before in their previous visits to the park.

#### **Detailed study**

A deeper comparison between the measuring point in the lake of Schlosspark and the measuring point in the lake of Treptower park, both points classified with a SPL of 55 - 60 dBA, has been made.

#### **Soundwalk questionnaire**

The figure below shows that the feeling of peacefulness in the lake in Treptower Park is higher than in the lake in Schlosspark. But contrary from what would be expected, the noise annoyance is higher in Treptower Park than in Schlosspark. Similar answers were given due to the loudness and unpleasantness, as well as, chaos, relaxation, beauty and safety. Besides, several disagreements were found in what the participants feel as quiet.

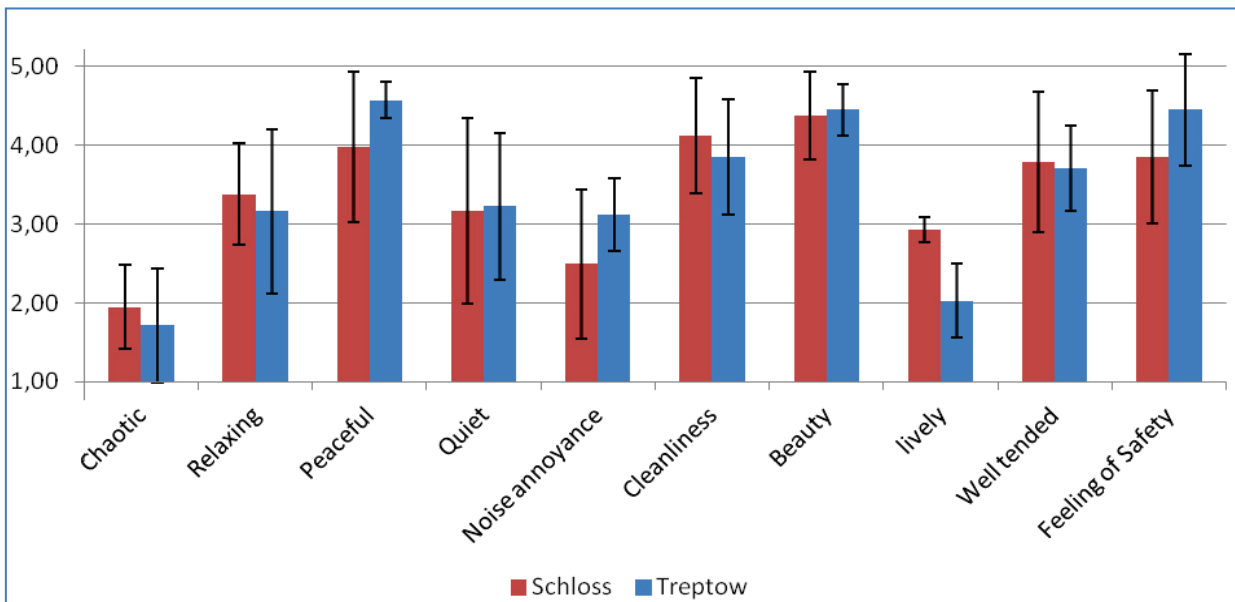


Figure 13: Results of the soundwalk questionnaire

The recognized sound sources were classified in three groups related with their origin: transport noise sources, human noise sources and natural noise sources.

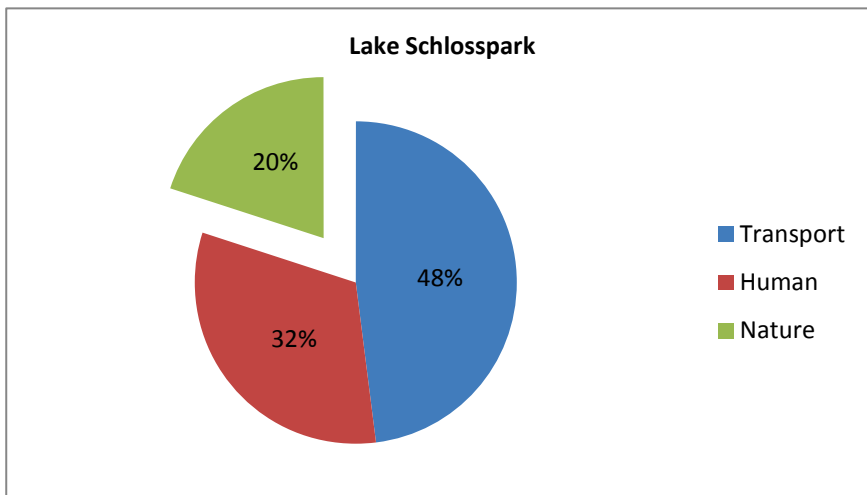


Figure 14: Sounds recognized and distributed in categories depending of their origin – Lake Schlosspark

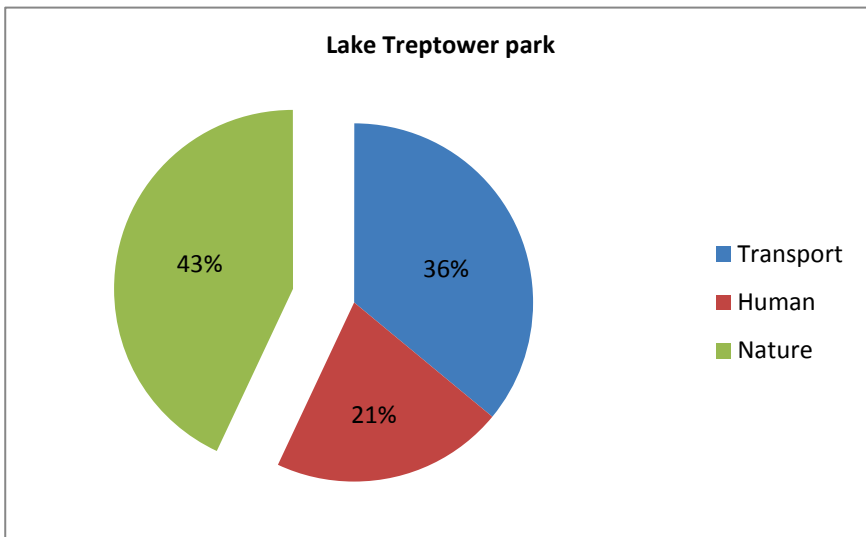


Figure 15: Sound recognized and distributed in categories depending of their origin - Lake Treptower park

As it is shown in the figures above, more sounds coming from natural sources were identified in Treptower park.

Secondly, in the part of the soundwalk questionnaire called: "Going through my mind", deeper comments regarding the past of the experts were collected in Treptower Park, and comments with detailed description of the view and the sound sources were collected in Schlosspark.

### Binaural recordings analysis

The psychoacoustic analysis of the binaural recordings shows that the SPL in Treptower Park in the moment of the soundwalk was 53 dBA and in Schlosspark it was 49dBA. The four dBA of difference was supported by the loudness and the roughness, both parameters higher in Treptower Park.

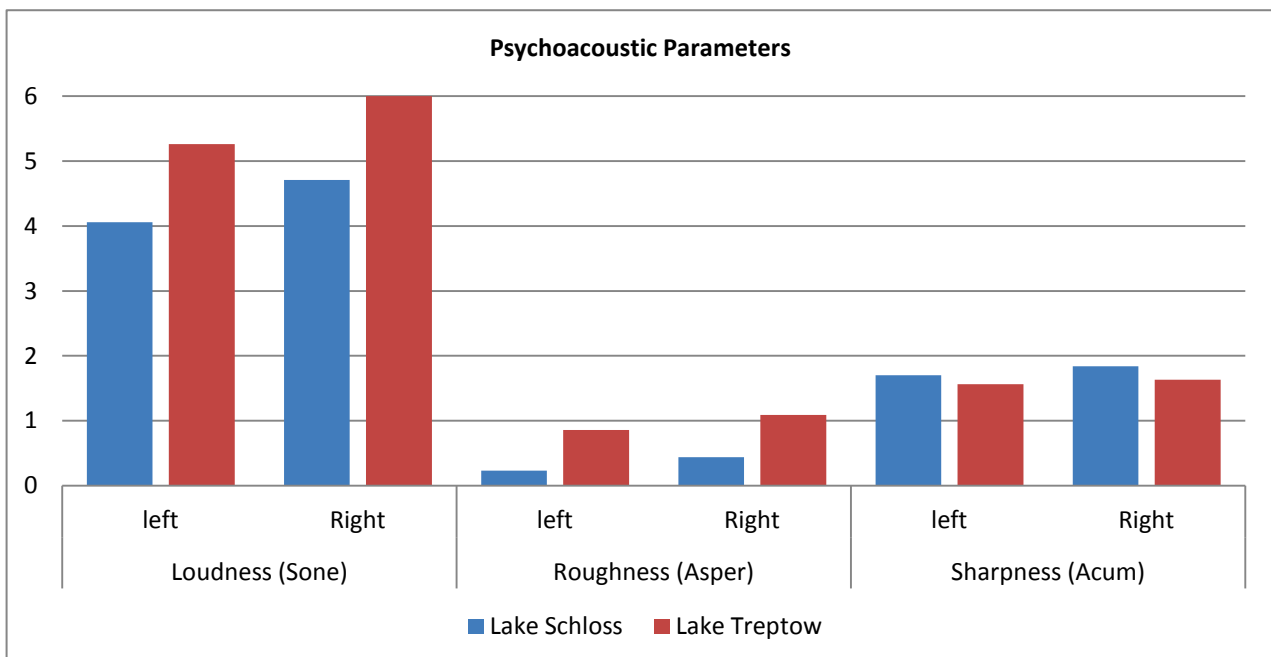


Figure 16: Results of the analysis of the binaural recordings

In the next figures, the spectral analysis of the recordings taken during the soundwalk in the lakes are shown. It is seen how the traffic is dominating the low frequency spectrum, meanwhile birds and walks over gravel dominate a blurry high frequency spectrum.

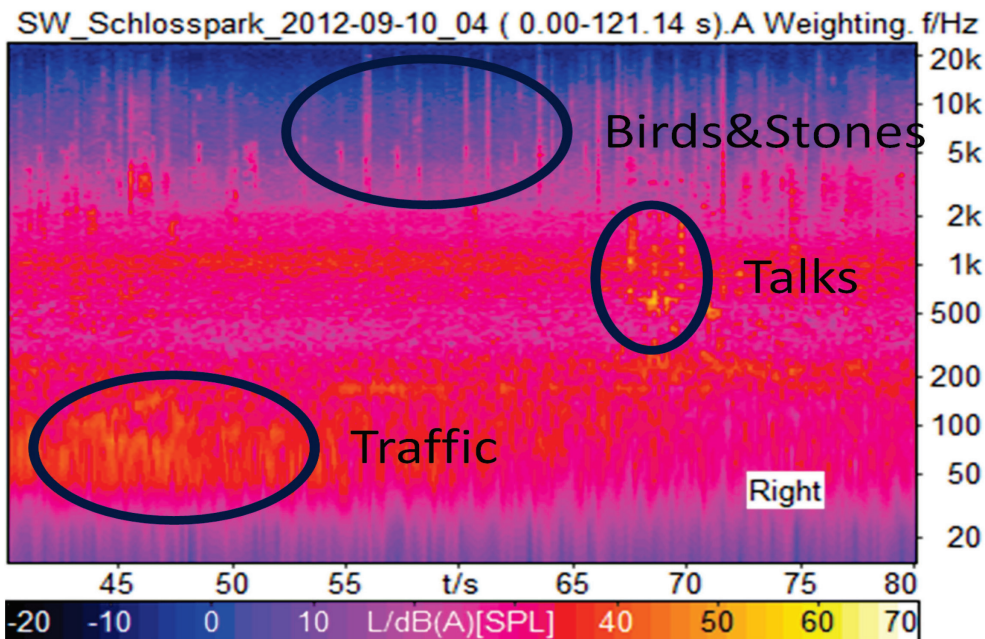


Figure 17: Spectral analysis of the recording taken in the lake in Schlosspark (right)

On the other hand, in Treptower park, the spectral analysis shows how the traffic dominates low and middle frequency spectra, and in in the high frequency spectra appears clear the song of the birds.

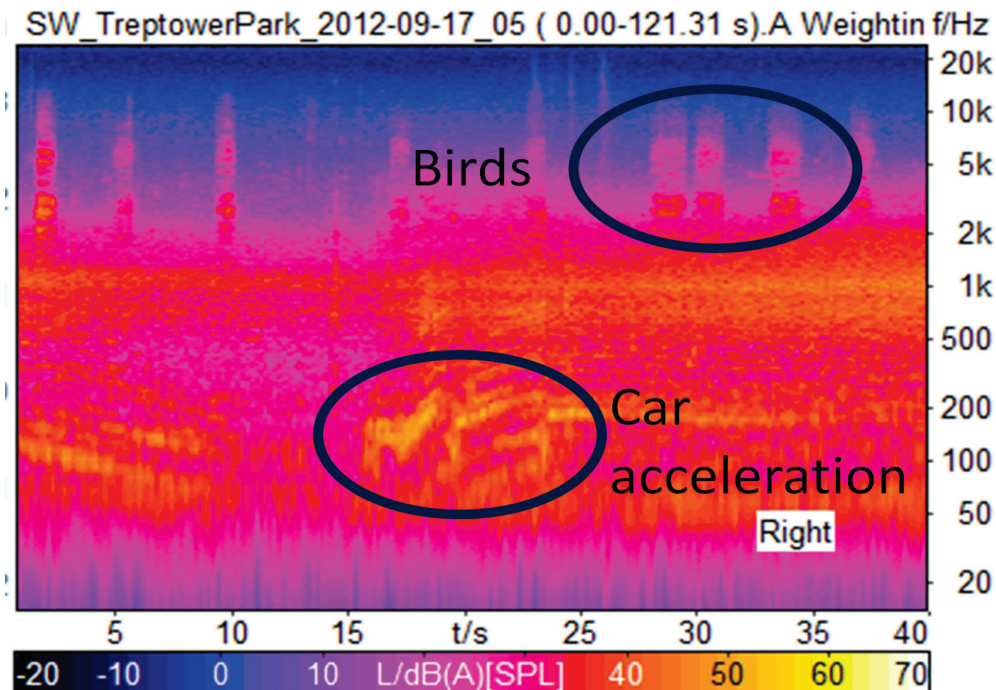


Figure 18: Spectral analysis of the recording taken in the lake in Treptower park (right).



## Conclusions

In summary, this research has produced the following conclusions:

The sound pressure level value shows to be a good tool for giving a first impression about the feeling of annoyance in a park, but it does not show the complexity of a soundscape, and for that reason it is not an appropriate tool for classifying the soundscape quality of a place. That is why further research is needed to classify a place as “quiet”, when quiet means good quality soundscape.

The background of the interviewees and the experts involved in the study is very important to understand the soundscape of the place, and has influenced the answers that the interviewees have given.

Other parameters such as cleanliness, liveliness and security among others must be taken into account for the evaluation of the place, as the correlation matrices show in the APPENDIX III.

How annoying is the sound in a place of the park, is related with the expectation that the expertise has of this place.

During the everyday usage of the park by the visitors, they are only focused on what they are doing, and they do not notice the background noise, even when it is loud.

The positive characteristics that a quiet area has to have are mostly not related with sound, but have an influence in how the sound is perceived.

## Recommendations for further lines of research

During the process of work of this project, several lines of research haven't been covered for different reasons; most of them because of the lack of money and time:

- Measure physiologic parameters before and after visiting a park.
- To repeat the soundwalks with common users of Schlosspark Charlottenburg.
- Analyze the soundscape of parks that are not so beloved, and compare the results.
- Deeper analysis of the visual perception
- Deeper analysis of the masking sounds: frequency, amplitude and voluntary masking.

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## APPENDIX I

**Der vorliegende Fragenbogen ist ein Teil von einer Masterarbeit. Der Hauptgrund von dieser Arbeit ist herauszufinden wie man dieses stillen Plätze protegieren muss, und was wichtig ist für die Benutzer.**

Wie heisst der Park?

*What's the name of the park?*

Datum

*Date*

Geschlecht

*Gender*

Wie alt sind Sie?

*How old are you?*

Warum kommen Sie hierher?

*Why do you come to this park?*

Mögen Sie diesen Park?

*Do you like the park?*

Wenn Ja oder nein: Warum?

*If the answer was "Yes" or "not": Why?*

Wie oft kommen Sie hierher?

*How often do you come to this park?*

Wenn Sie hier sind, wie lange bleiben Sie normalerweise hier? Mehrere Stunden?

*Usually, how many hours do you spend here?*

Kommen Sie normalerweise alleine hierher?

*Do you usually go alone or with someone else?*

Was ist der hauptsächliche (wichtigste) Grund, warum Sie hierher kommen?

*What is the main reason for visiting the park?*

Würden Sie eigentlich einen anderen Park bevorzugen?

*Would you prefer a different one (Park)?*

Wenn ja: Warum? Welche?

*If the answer was „yes“, why? Which one?*

Was ist da anders?

*What is different there?*

Gibt es hier Geräusche, die Sie stören? Bitte beschreiben Sie diese.

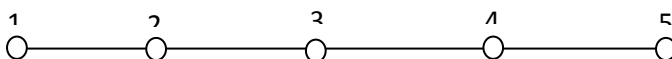
*Is there any annoying sound? Describe it/them.*

Wie sollte ein Park beschaffen sein, damit Sie ihn als „guten“ Park klassifizieren?

*Which characteristics should a park have to be qualified as perfect?*

Wie bewerten Sie diesen Park? (1 ist die beste Bewertung, 5 ist die schlechteste.)

*Which mark would you give to this park (1 the best – 5 the worst)*



Wohnen Sie in der Nähe?

*Is your house close to the park?*

Welche Geräusche sind in der Nähe Ihrer Wohnung oder ihres Hauses?

*What kind of sounds do you find around your house?*

Straßenverkehr, Schienenverkehr oder Fluglärm?

*Is a traffic road, airport or railroad close to your home?*

Welches ist die stärkste Geräuschquelle in Ihrer Wohnumgebung?

*What's the biggest noise source around your home?*

Fühlen Sie sich gestört?

*Do you feel disturbed by it?*

Wenn ja: eher nachts oder am Tag?

*If the answer was „Yes“: it is during the night or during the day?*

Haben Sie jemals Probleme gehabt oder haben Sie Probleme gut zu hören?

*Have you ever had hearing problems?*

Wenn Sie diesen Park beschreiben würden, wie würde das aussehen?

*Give us your thoughts about the park with your own words.*

**Vielen herzlichen Dank, dass Sie unsere Befragung unterstützt haben.**

***Thank you very much for participating in our questionnaire.***

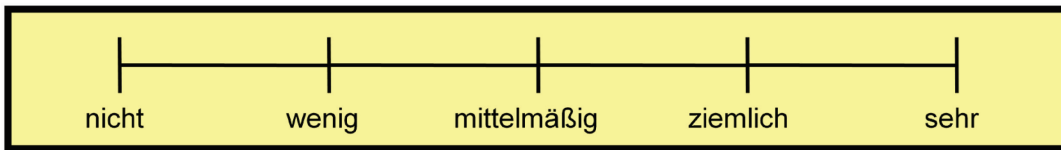


Soundwalk  
Schlosspark – Treptower-Park

Messort:

Uhrzeit:

Wie laut ist es hier?



Wie unangenehm ist es hier?



Was mir jetzt gerade durch den Kopf geht ...

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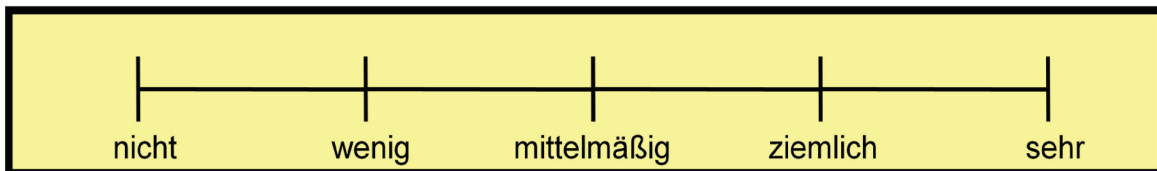
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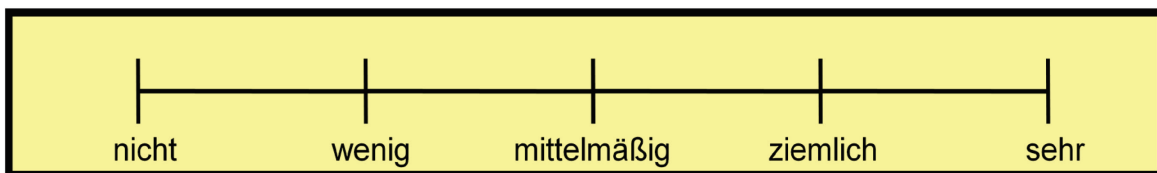
Bitte ordnen Sie die Geräuschquelle der Auffälligkeit nach :  
1 am Auffälligsten, 8 am wenigsten auffällig:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_

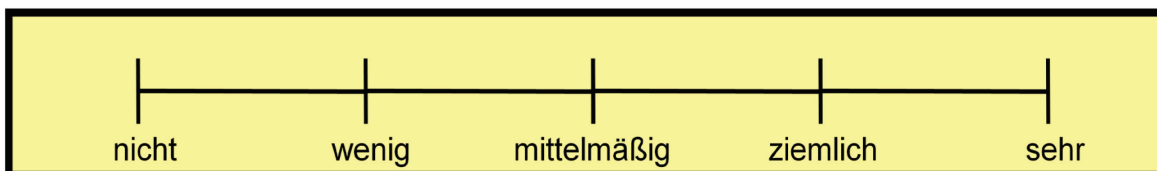
Wie chaotisch ist es hier?



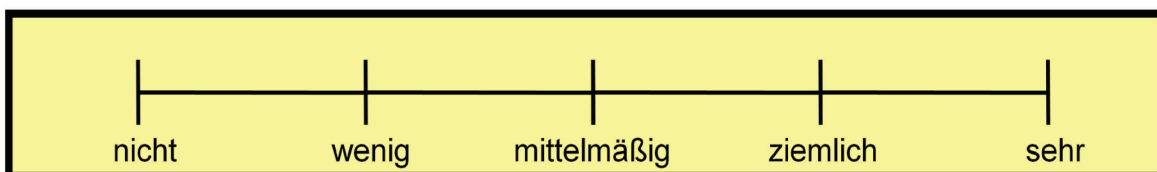
Wie entspannend ist hier?



Wie friedlich ist hier?



Wie ruhig ist hier?



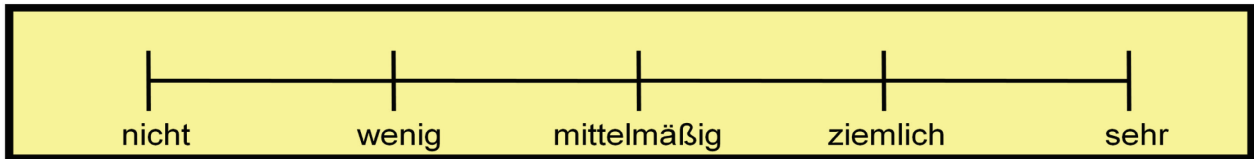
Fühlen Sie sich hier durch Geräusche gestört?



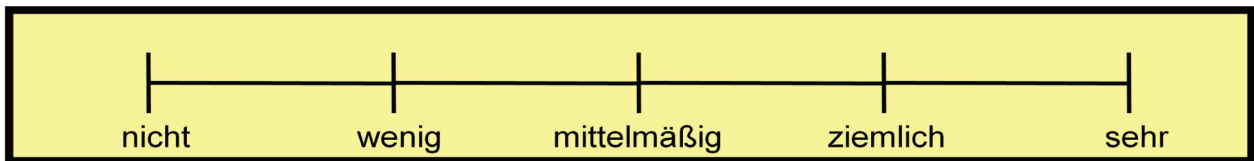


Über den Ort:

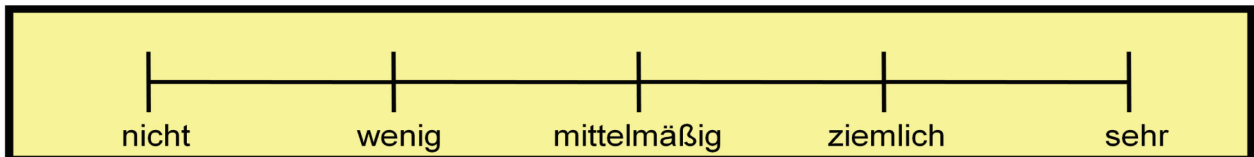
Wie sauber ist hier?



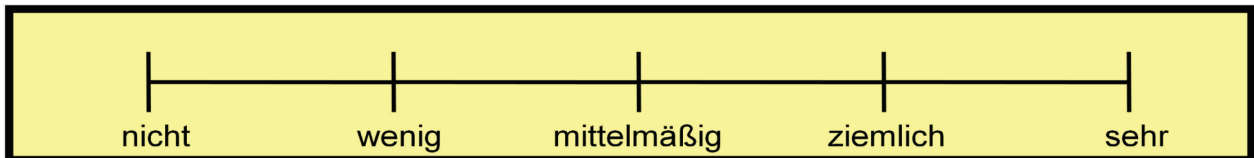
Wie schön ist hier?



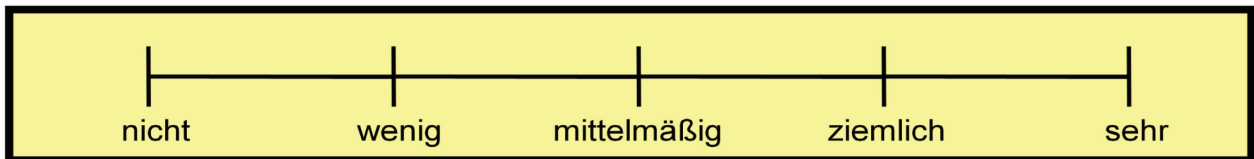
Wie belebt ist hier?



Wie gut geplegt ist hier?



Wie sicher fühlen Sie hier?



## APPENDIX III

Correlation matrices of Schlosspark results.

### CASTLE

	Laut	Unangenehm	Chaotisch	Entspannend	Friedlich	Ruhig	Geräusche Gestört	Sauber	Schön	Belebt	Gut geplegt	Sicherheit
Laut	1,0											
Unangenehm	0,9	1,0										
Chaotisch	0,5	0,8	1,0									
Entspannend	-0,9	-0,8	-0,4	1,0								
Friedlich	-0,8	-1,0	-0,8	0,7	1,0							
Ruhig	-0,7	-0,8	-0,7	0,5	0,9	1,0						
Geräusche Gestört	0,4	0,3	0,2	0,0	-0,5	-0,5	1,0					
Sauber	-0,1	-0,4	-0,7	-0,2	0,6	0,6	-0,6	1,0				
Schön	0,5	0,4	0,0	-0,7	-0,2	0,2	-0,1	0,4	1,0			
Belebt	0,8	0,6	0,2	-0,5	-0,7	-0,7	0,8	-0,2	0,2	1,0		
Gut geplegt	0,2	-0,3	-0,7	-0,2	0,4	0,3	-0,3	0,9	0,3	0,1	1,0	
Sicherheit	-0,6	-0,7	-0,6	0,5	0,8	0,4	-0,6	0,4	-0,6	-0,6	0,4	1,0

### FOUNTAIN

	Laut	Unangenehm	Chaotisch	Entspannend	Friedlich	Ruhig	Geräusche Gestört	Sauber	Schön	Belebt	Gut geplegt	Sicherheit
Laut	1,0											
Unangenehm	0,0	1,0										
Chaotisch	0,7	0,7	1,0									
Entspannend	0,1	0,4	0,6	1,0								
Friedlich	-0,4	0,4	-0,2	-0,7	1,0							
Ruhig	-0,7	0,6	0,0	0,3	0,3	1,0						
Geräusche Gestört	0,2	1,0	0,8	0,3	0,4	0,5	1,0					
Sauber	-0,3	0,8	0,2	-0,2	0,9	0,6	0,8	1,0				
Schön	-0,1	0,4	-0,1	-0,6	1,0	0,1	0,5	0,8	1,0			
Belebt	0,0	0,7	0,6	0,9	-0,3	0,6	0,6	0,1	-0,3	1,0		
Gut geplegt	-0,3	0,4	-0,2	-0,6	1,0	0,2	0,4	0,8	1,0	-0,2	1,0	
Sicherheit	-0,7	-0,7	-0,9	-0,3	-0,1	0,0	-0,8	-0,4	-0,3	-0,1	-0,1	1,0

## LAKE

	Laut	Unangenehm	Chaotisch	Entspannend	Friedlich	Ruhig	Geräusche Gestört	Sauber	Schön	Belebt	Gut geplegt	Sicherheit
Laut	1,0											
Unangenehm	0,6	1,0										
Chaotisch	0,8	0,5	1,0									
Entspannend	-0,4	-0,9	-0,6	1,0								
Friedlich	-0,5	-0,8	-0,8	0,9	1,0							
Ruhig	-0,2	-0,9	-0,3	0,9	0,8	1,0						
Geräusche Gestört	0,2	0,8	0,3	-0,9	-0,8	-1,0	1,0					
Sauber	-0,3	-0,9	-0,1	0,7	0,5	0,9	-0,8	1,0				
Schön	0,1	-0,3	-0,5	0,7	0,8	0,5	-0,6	0,1	1,0			
Belebt	1,0	0,6	0,8	-0,4	-0,5	-0,2	0,2	-0,3	0,1	1,0		
Gut geplegt	0,0	-0,8	-0,2	0,9	0,7	0,9	-0,9	0,8	0,6	0,0	1,0	
Sicherheit	-0,7	-0,9	-0,8	1,0	0,9	0,8	0,7	0,7	0,5	-0,7	0,7	1,0

## FIELD

	Laut	Unangenehm	Chaotisch	Entspannend	Friedlich	Ruhig	Geräusche Gestört	Sauber	Schön	Belebt	Gut geplegt	Sicherheit
Laut	1,0											
Unangenehm	0,8	1,0										
Chaotisch	-0,1	0,4	1,0									
Entspannend	0,5	0,1	-0,2	1,0								
Friedlich	0,9	0,9	0,2	0,1	1,0							
Ruhig	0,6	0,4	-0,4	-0,2	0,7	1,0						
Geräusche Gestört	-0,5	0,2	0,7	-0,7	-0,1	-0,4	1,0					
Sauber	0,6	0,1	-0,2	0,9	0,3	0,1	-0,8	1,0				
Schön	-0,1	-0,4	-1,0	0,0	-0,3	0,3	-0,6	0,1	1,0			
Belebt	-0,1	-0,3	-0,2	-0,6	0,0	0,6	-0,1	-0,2	0,3	1,0		
Gut geplegt	-0,6	-0,3	-0,2	-0,9	-0,3	0,1	0,5	-0,9	0,3	0,6	1,0	
Sicherheit	0,1	-0,1	0,1	0,9	-0,2	-0,6	-0,4	0,7	-0,2	-0,8	-0,8	1,0

# PATH

	Laut	Unangenehm	Chaotisch	Entspannend	Friedlich	Ruhig	Geräusche Gestört	Sauber	Schön	Belebt	Gut geplegt	Sicherheit
Laut	1,0											
Unangenehm	0,8	1,0										
Chaotisch	-0,1	0,4	1,0									
Entspannend	0,5	0,1	-0,2	1,0								
Friedlich	0,9	0,9	0,2	0,1	1,0							
Ruhig	0,6	0,4	-0,4	-0,2	0,7	1,0						
Geräusche Gestört	-0,5	0,2	0,7	-0,7	-0,1	-0,4	1,0					
Sauber	0,6	0,1	-0,2	0,9	0,3	0,1	-0,8	1,0				
Schön	-0,1	-0,4	-1,0	0,0	-0,3	0,3	-0,6	0,1	1,0			
Belebt	-0,1	-0,3	-0,2	-0,6	0,0	0,6	-0,1	-0,2	0,3	1,0		
Gut geplegt	-0,6	-0,3	-0,2	-0,9	-0,3	0,1	0,5	-0,9	0,3	0,6	1,0	
Sicherheit	0,1	-0,1	0,1	0,9	-0,2	-0,6	-0,4	0,7	-0,2	-0,8	-0,8	1,0

Correlation matrices of Treptower Park results.

## PIER

	Laut	Unangenehm	Chaotisch	Entspannend	Friedlich	Ruhig	Geräusche Gestört	Sauber	Schön	Belebt	Gut geplegt	Sicherheit
Laut	1,00											
Unangenehm	0,53	1,00										
Chaotisch	0,04	-0,54	1,00									
Entspannend	0,91	0,80	-0,32	1,00								
Friedlich	-0,50	0,33	0,33	-0,70	1,00							
Ruhig	0,02	0,64	-0,76	0,29	-0,63	1,00						
Geräusche Gestört	0,85	0,69	-0,47	0,93	-0,57	0,45	1,00					
Sauber	0,35	0,35	-0,78	0,55	-0,07	0,33	0,70	1,00				
Schön	0,44	0,31	-0,53	0,60	-0,02	-0,04	0,61	0,89	1,00			
Belebt	-0,04	-0,68	0,74	-0,43	0,47	-0,37	-0,31	-0,55	-0,62	1,00		
Gut geplegt	0,39	0,34	-0,76	0,55	-0,08	0,41	0,76	0,98	0,81	-0,43	1,00	
Sicherheit	0,13	0,52	-0,96	0,46	-0,26	0,60	0,59	0,91	0,74	-0,76	0,88	1,00

## RIVER

	Laut	Unangenehm	Chaotisch	Entspannend	Friedlich	Ruhig	Geräusche Gestört	Sauber	Schön	Belebt	Gut geplegt	Sicherheit
Laut	1,00											
Unangenehm	0,63	1,00										
Chaotisch	0,15	-0,12	1,00									
Entspannend	0,32	-0,37	-0,17	1,00								
Friedlich	0,22	-0,61	0,33	0,81	1,00							
Ruhig	-0,74	-0,68	-0,01	0,20	0,17	1,00						
Geräusche Gestört	0,92	0,52	0,50	0,24	0,30	-0,56	1,00					
Sauber	-0,84	-0,19	0,06	-0,76	-0,60	0,46	-0,69	1,00				
Schön	0,18	-0,39	-0,30	0,98	0,70	0,35	0,10	-0,64	1,00			
Belebt	0,77	0,52	0,66	-0,15	0,11	-0,71	0,88	-0,41	-0,33	1,00		
Gut geplegt	-0,57	0,16	0,06	-0,96	-0,80	0,04	-0,49	0,91	-0,89	-0,12	1,00	
Sicherheit	-0,89	-0,33	0,09	-0,71	-0,49	0,48	0,98	0,98	-0,60	-0,44	0,86	1,00

## FIELD

	Laut	Unangenehm	Chaotisch	Entspannend	Friedlich	Ruhig	Geräusche Gestört	Sauber	Schön	Belebt	Gut geplegt	Sicherheit
Laut	1,00											
Unangenehm	0,30	1,00										
Chaotisch	0,97	0,14	1,00									
Entspannend	0,28	-0,75	0,48	1,00								
Friedlich	-0,17	-0,98	-0,02	0,80	1,00							
Ruhig	-0,92	0,00	-0,94	-0,50	-0,07	1,00						
Geräusche Gestört	0,92	-0,01	0,91	0,49	0,18	-0,86	1,00					
Sauber	-0,14	-0,71	-0,15	0,35	0,78	0,05	0,23	1,00				
Schön	0,47	-0,43	0,46	0,53	0,60	-0,44	0,77	0,77	1,00			
Belebt	0,18	-0,47	0,18	0,44	0,64	-0,10	0,54	0,83	0,93	1,00		
Gut geplegt	0,56	-0,45	0,66	0,80	0,62	-0,56	0,81	0,48	0,87	0,78	1,00	
Sicherheit	0,18	-0,51	0,24	0,57	0,68	-0,11	0,53	0,72	0,89	0,86	0,86	1,00

## SOVIETIC WAR MONUMENT

	Laut	Unangenehm	Chaotisch	Entspannend	Friedlich	Ruhig	Geräusche Gestört	Sauber	Schön	Belebt	Gut geplegt	Sicherheit
Laut	1,00											
Unangenehm	-0,89	1,00										
Chaotisch	-0,30	0,66	1,00									
Entspannend	-0,70	0,82	0,38	1,00								
Friedlich	-0,63	0,39	-0,39	0,60	1,00							
Ruhig	-0,62	0,50	0,17	0,12	0,42	1,00						
Geräusche Gestört	0,87	-0,88	-0,31	-0,88	-0,75	-0,56	1,00					
Sauber	0,42	-0,70	-0,96	-0,34	0,38	-0,22	0,31	1,00				
Schön	-0,77	0,81	0,41	0,64	0,59	0,81	-0,90	-0,38	1,00			
Belebt	0,74	-0,91	-0,83	-0,61	-0,01	-0,35	0,62	0,91	-0,58	1,00		
Gut geplegt	0,56	-0,77	-0,91	-0,33	0,25	-0,41	0,40	0,98	-0,50	0,94	1,00	
Sicherheit	-0,70	0,69	0,17	0,67	0,77	0,74	-0,91	-0,12	0,96	-0,37	-0,23	1,00

# LAKE

	Laut	Unangenehm	Chaotisch	Entspannend	Friedlich	Ruhig	Geräusche Gestört	Sauber	Schön	Belebt	Gut geplegt	Sicherheit
Laut	1,00											
Unangenehm	-0,37	1,00										
Chaotisch	-0,32	0,56	1,00									
Entspannend	0,55	-0,95	-0,76	1,00								
Friedlich	0,83	-0,30	-0,35	0,47	1,00							
Ruhig	0,82	-0,79	-0,67	0,92	0,64	1,00						
Geräusche Gestört	0,48	0,54	0,35	-0,40	0,16	0,00	1,00					
Sauber	0,33	-0,58	-0,90	0,74	0,58	0,61	-0,50	1,00				
Schön	0,18	-0,77	-0,76	0,81	-0,06	0,68	-0,39	0,52	1,00			
Belebt	-0,10	0,56	0,21	-0,48	0,38	-0,44	0,05	0,11	-0,78	1,00		
Gut geplegt	0,90	-0,52	-0,66	0,74	0,88	0,89	0,15	0,70	0,37	-0,02	1,00	
Sicherheit	-0,83	0,72	0,20	-0,73	-0,65	-0,85	-0,10	-0,27	-0,35	0,36	-0,73	1,00