Soundscape evaluation in outdoor urban environments

(Bachelor's Thesis)

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Abstract

The sounds around us affect the way we experience the environment. It is still unclear how particular sounds, such as passing cars, affect us however. Knowing how sounds in the city influence mood and emotion could help improve these cities. To explore this, an experiment was set up that uses the scientific construct of core affect to measure how people evaluate different sound environments. Core affect allows us to classify the moods that are evoked by sound environments along two axes: pleasant-unpleasant and eventful-uneventful. Participants were asked to evaluate five different urban sound environments by filling out a questionnaire. At the same time, recordings were made of these sonic environments. These recordings were annotated to classify the sounds in the recordings based on what sources are distinguishable in the recording. Seven classes of sounds that correlated with core affect were found. These results show the potential applicability of core affect to this kind of study. More elaborate studies could be fruitful and provide context to the current findings.

1 Introduction

The sounds around us affect the way we experience the environment. Research into the way sounds affect us has been focused on the negative influence of sound i.e., sound pollution. Regulations for sound pollution are commonly based on sound pressure levels (SPL) but as researchers have pointed out this is not necessarily a sufficient indicator of how people perceive sound (Kariel, 1990; Gidlöf-Gunnarsson & Öhrström, 2007; Zhang & Kang, 2007). Current research on noise pollution and sound-perception focusses on soundscapes (for example: (Raimbault & Dubois, 2005; Zhang & Kang, 2007)). Soundscape is a term coined by Canadian composer and theorist Murray Schafer (Schafer, 1977) and is used to refer to the acoustical environment as experienced by a person or group of persons at that moment. There have been several studies adressing how people assess urban soundscapes and how these assessments relate to signal components in the soundscapes, usually in relation to noise pollution (see for example: Raimbault, Lavandier, & Bérengier (2003); Zhang & Kang (2007)). These studies show promising results correlating signal components with peoples evaluations of soundscapes.

Russell (2003) provides a scientific approach to how people feel. His theory of human moods is based on changes in core affect. Core affect is defined as: "that neurophysiological state consciously accessible as the simplest raw (nonreflective) feelings evident in moods and emotions." (Russell, 2003, p. 148). This core affect is determined along two axes: pleasant-unpleasant and eventful-uneventful (Russell, 1980), the core affect is influenced by our perception of sound but also influences our perception of sound. Axelsson, Nilsson, & Berglund (2010) have found that the pleasantness and eventfulness axes can also be used when studying people evaluating soundscapes. In their research they had subjects classify different sound-

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scapes based on 116 attributes (words like natural, chaotic and unobtrusive). This led to a circle with pleasantness and eventfulness as axes, classifying all the words by core affect (see figure 1). This circle provides a practical way of classifying different moods evoked by soundscapes. Recent research shows systems that automatically generate subjective evaluations of urban outdoor soundscapes (see for example: (Yu & Kang, 2009)). A first step towards an automatic classifier of indoor soundscapes has been made by Broers (2011). She was able to correlate certain signal components, like the energy in a recording, to Axelssons mood circle.

The focus of the current study is on how people evaluate outdoor urban soundscapes. The results of this study can be used as a guide in designing an automatic classifier for particular sounds by providing annotated recordings. Results of the core affect questionnaire can be used to expand such a classifier to a classifier that generates evaluations of soundscapes. Insight into the experience of sound can also provide insight into which outdoor urban environments are suitable for particular activities in relation to their sound environment. The study was conducted using a questionnaire designed to obtain information about subjects' core affects in different environments. Audio recordings of the soundscapes were made at the locations where the subjects answered the questionnaire. These recordings were annotated to classify the sounds. The classes that these annotations provided were correlated with the results obtained from the core affect questionnaire.

2 Method

2.1 Experiment

2.1.1 Participants

Twenty inhabitants of the city of Groningen, the Netherlands participated in the experiment. Most of them were students from Universty of Groningen. Each of the participants received a compensation of ten Euros for participating in the experiment, that lasted 50-70 minutes. The participants consisted of 5 females and 15 males. Age range: 19-27, mean age = 22.4.

2.1.2 Materials

With each participant five locations were visited (the same locations for each participant, see Figure 3 and 4). These locations were chosen by the researchers on the basis of subjectively having differing sound environments due to the presence or absence of traffic, birds, etc. The goal while choosing these locations was to have five locations that between them could evoke a wide range of core affects within easy walking distance.

Stereo recordings of the sound environment were made using a TASCAM DR-07 mkII portable digital recorder. The input level was set at -20 dB at all times. The recordings were made in 24bit, 44.1 kHz WAV format. For the first fifteen participants or 74 recordings, the recordings were made with the recorder's microphones exposed to weather conditions. This subset consists of 74 instead of 75 recordings because one location was closed while doing the experiment with one of the participants. For the last five subjects or 25 recordings a wind cap was used to prevent excessive wind interference on the recordings.

Video recordings were made with a MUVI HD10 video recorder. The videos were made at 30fps at 1080p in MOV format with a H.264 codec. Due to an error in transferring data from the recorder to a hard disk, the set of video recordings was incomplete i.e., not for every audio recording, a video recording is present. Therefore these recordings were not used in this study.

To examine the participants' core affect assessment in a sound environment, a questionnaire was designed. Dutch participants were questioned, therefore the questionnaire was in Dutch. The questionnaires contained six questions and were to be filled out by the participants with pen on paper. The questionnaire contained six questions to obtain a large dataset that can be used in future studies. The questionnaire contained both open and closed questions. Due to time constraints not all of them were included in the analysis, in this study only closed questions were used. The questions that were used will be described next, for the entire questionnaire see appendix A.

In the first question used, participants were asked to indicate on a scale from 0 (not applicable at all) to 100 (very applicable) if eight descriptions were applicable to their current experience of the

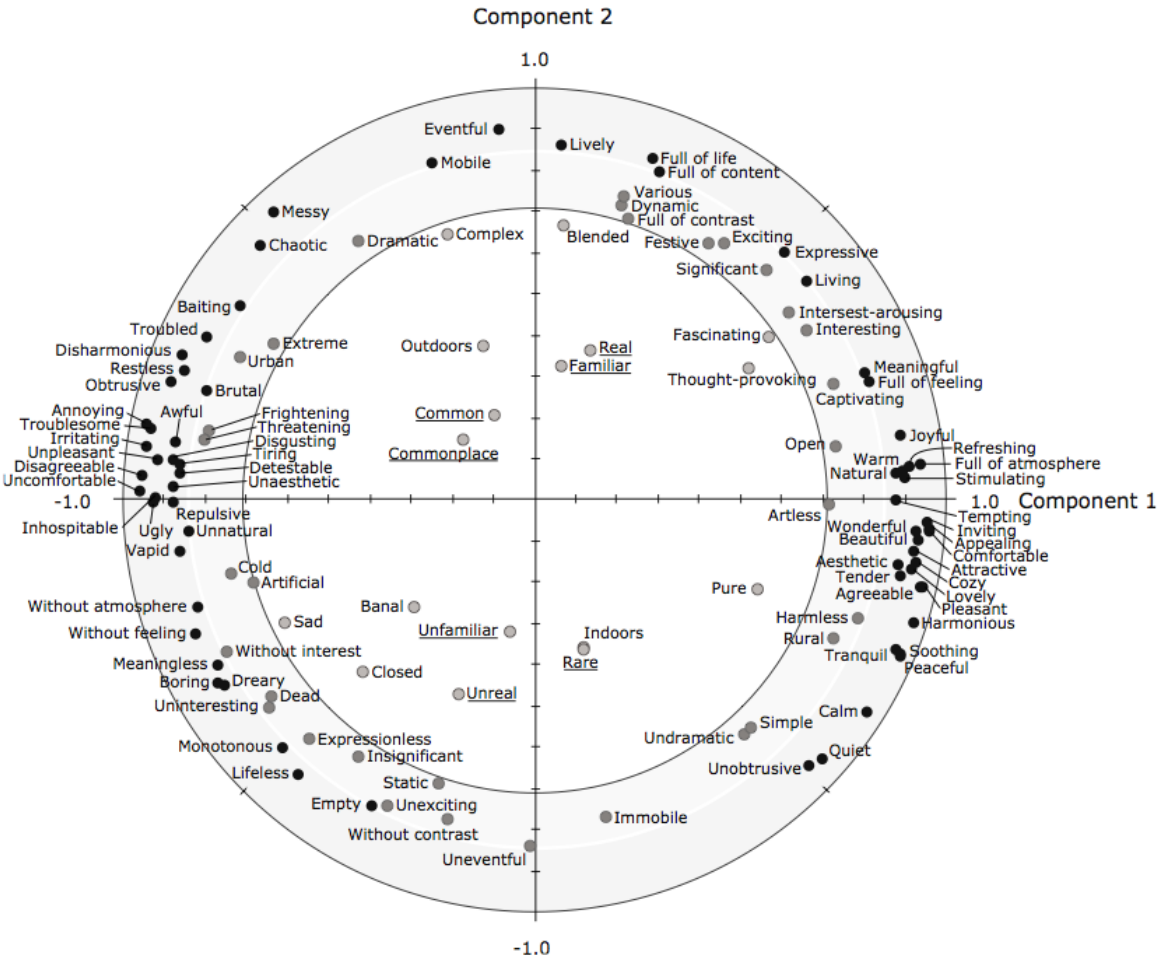


Figure 1: The circle with 116 attributes from Axelsson et al. (2010). The y-axis represent pleasant-unpleasant and the x-axis represents eventful-uneventful.

sound environment ("Hoe goed zijn deze omschrijvingen van toepassing op je huidige geluidsbeleving"; English: "How well are these descriptions applicable to your current experience of the sound environment"). Each of the descriptions corresponded to an extreme on the circle of core affect. The extremes used were the ends of the pleasant-unpleasant and eventful-uneventful axes, as well as the ends of the two axes at a 45° angle relative to those two axes: chaotic-calm and exciting-monotonous (see Figure 2). These eight descriptions were found by Kangur (2011) by defining eight categories from Axelssons circle (Axelsson, Nilsson, & Berglund, 2010). Each description consisted of five Dutch words, translated from the English words in Axelsson et al. (2010) (who used Swedish words in their research), that fell in those categories on the circle (see Table 1). The second question used was intended to gain insight into the suitability of the environments for particular activities and the behavioral implications of core affect. Participants were asked to indicate on a scale from 0 (very bad) to 100 (very well) how well they would be able to perform each of six activities on a pleasant summer day ("Hoe goed zou je deze activiteiten uit kunnen voeren op een aangename zomerdag met je huidige geluidsbeleving"; English: "How well would you be able to perform these activities on a pleasant summer day with your current experience of the sound environment"). The activities were: taking

Table 1: The eight categories and the corresponding descriptions taken from Kangur (2011)

Category	Dutch description	English description
Eventful	Veelbewogen, Opgewekt, Levendig, Dynamisch, Actief	Eventful, Vibrant, Lively, Dynamic, Active
Exciting	Fascinerend, Expressief, Interesse opwekkend, Levend, Prikkelend	Fascinating, Expressive, Interest-arousing, Living, Thought-provoking
Pleasant	Warm, Natuurlijk, Prachtig, Gezellig, Comfortabel	Warm, Natural, Wonderful, Cozy, Comfortable
Calm	Simpel, Kalm, Stil, Onopvallend, Bedaard	Simple, Clam, Quiet, Unobtrusive, Tranquil
Uneventful	Onbewogen, Immobiel, Passief, Stilstaand, Onveranderlijk	Uneventful, Immobile, Passsive, Static, Without contrast
Monotonous	Monotoon, Saai, Levenloos, Expressieloos, Oninteressant	Monotonous, Boring, Lifeless, Expressionless, Uninteresting
Unpleasant	Irriterend, Onaangenaam, Walgelijk, Afschrikwekkend, Verschrikkelijk	Irritating, Uncomfortable, Disgusting, Frightening, Awful
Chaotic	Extreem, Chaotisch, Rommelig, Verward, Onthutst	Extreme, Chaotic, Messy, Confusing, Distracting

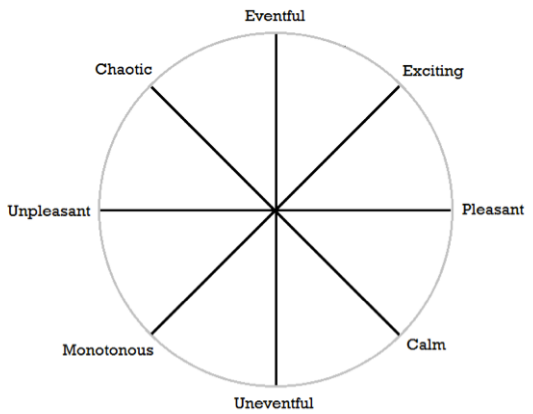


Figure 2: The circle of core affect with four axes and eight extremes, taken from Kangur (2011)

a nap, reading a book, having an intimate conversation, having a conversation about the weather, thinking about a difficult problem and forgetting about your stress. These six activities were chosen, after deliberation among the researchers about their mood in relation to these activities, to correspond to moods evoked by different places on the circle of core affect. To limit the influence of weather conditions on the response, a specific weather condition for these activities was stated.

2.1.3 Design

The independent variables are: the sound environment as expressed in percentages of presence of different classes of sounds, obtained by annotation of the recordings; the weather conditions as expressed in: temperature, wind, sun, light, visibility and rain, all expressed on a scale from 0-100; scores for how well the six activities could be performed in that sound environment. The dependent variable is the evaluation of that sound environment, as expressed in how applicable the eight descriptions are to the experience of the sound environment.

2.1.4 Procedure

Each participant was taken on a walk through the city of Groningen, the Netherlands, one participant at a time. For each participant the route along the five locations was the same, but the starting location was randomized as was whether the route was taken clockwise or counter-clockwise. At the start of the experiment the participants were told how many locations would be visited and how long the experiment would approximately take. Participants were also told that the experiment was about how people experience sound environments.

At each location the participant was asked to stand in a certain spot (the same spot for each participant), listen to the sound environment and

Figure 3: A map of the centre of Groningen, the numbers indicate where the recording locations are.

make a list of what they heard ("Luister goed naar de omgeving, schrijf de geluiden op die je hoort"; English: "Listen well to your surroundings, write down the sounds you hear"). There was no time limit for this. While the participants were making a list of the sounds they heard, the experimenter made a recording of the sound environment by standing next to the participant and holding both the audio recorder and the video recorder in his hands. When the list was finished, the participants continued with the rest of the questionnaire and the experimenter stopped recording. While the participant was filling out the rest of the questionnaire, the experimenter noted the date, time of day, location and weather conditions.

2.2 Recording protocol

During the experiment, some shortcomings of the recording procedure came to light. To improve consistency and recording quality in future studies, this is seen as an ideal recording protocol:

1. Place the audio and video recorders on their respective tripods, make sure the audio recorder has a wind cap.
2. Place the tripods in the same spot and position the recorders with the same angle relative to their surroundings every time the same location is visited.
3. Verify that the audio recorder's microphones are positioned to make an ambient recording instead of a directed recording.
4. Check the settings of the recorders to make sure they are the same every time. Of special importance are the audio recorder's settings. Verify that the recording level is -20 dB at all times.
5. Tell the participant to start with the questionnaire and start recording with both recorders at the same time.
6. When the participant finishes with listening, clap your hands three times while both recorders are on to facilitate synchronizing audio and video.
7. Stop recording with both recorders
8. Pack up the recorders and the tripods.
9. Move on to the next location

Ideally the recordings should be obtained from the recorders and stored safely after each participant but it should at least happen after each day of recording. Always make sure the recorders are charged after they have been used.

2.3 Annotation

2.3.1 Materials

The recordings made during the experiment were annotated with software developed at the University of Groningen (van der Linden, 2011) specifically to annotate soundscapes. In this software the recording can be played back while a cochleogram of the recording is shown. The software allows the annotator to define classes of sounds and annotate the time in the recording during which the

(a) Location 1 on the map: Grote Markt, Groningen, the Netherlands

(b) Location 2 on the map: Prinsentuin, Groningen, the Netherlands

(c) Location 3 on the map: Burgerweeshuis, Groningen, the Netherlands

(d) Location 4 on the map: the garden of the academy building, Groningen, the Netherlands

(e) Location 5 on the map: Folkingestraat, Groningen, the Netherlands

Figure 4: Photographs of the recording locations

sound is audible as well as a rough frequency domain in which the sound is audible. Before annotating, the recordings were transformed from 24-bit stereo WAV format to 16-bit mono WAV format. The transformation from 24-bit to 16-bit was necessary because the annotation software is unable to read 24-bit audio. The recording level was kept at -20 dB. The transformation from stereo to mono was necessary because the cochleogram was calculated from the left channel of the stereo recordings. From the total of 99 recordings, only 50 were annotated due to time constraints. Included in these 50 recordings are the 25 recordings made with wind cap.

2.3.2 Procedure

The recordings were all annotated by the author. The goal of annotating the recordings was acquiring information about what makes up the sound environment. This information was used to find correlations with core affect. Both foreground and background were annotated. The distinction between a foreground and a background sound was made subjectively. A foreground sound temporarily masks some or all of the other sound in the recording while a background sound is audible together with other sounds and is sometimes masked. This distinction had no impact on the use of these classes in the analysis. A new foreground or background class was added if a sound (or group of sounds that subjectively belong together) was judged by the annotator as being distinctively different from the existing classes, based on both physical aspects of the sound (such as frequency, timbre) and aspects of the sound that were cognitively different to the annotator (such as the comprehensibility of speech). The sounds were classified into classes that represented some sort of activity as much as possible. The classes were organized according to a subjective ontology that developed during the annotation process. Speech was for example never classified as just speech. Speech is the top of the ontology and depending on what is audible it was classified in different ways. Sound that was identifiable as speech but was incomprehensible to the annotator was classified as 'murmuring'. Speech sound that was comprehensible to the annotator was classified as 'chatting' and speech sound that was both comprehensible and identifiable as passing by the recording position was classified as 'passing people speaking'. Because the frequency of children's voices was judged as being distinctively different from that of adult voices, there are also separate classes for children's speech (in these classes the same distinctions were made). To be clear: 'murmuring', 'chatting' and 'passing people speaking' are what are referred to as classes in this text, 'Speech' is the umbrella term. Traffic sounds fell into two broad categories: diffuse traffic and passing vehicles. This distinction was made because diffuse traffic represents a potentially constant factor in the sound environment (which can still be masked most of the time) while passing vehicles are separate, identifiable events meaning that they, according to the annotator, play a distinctively different role in the sound environment. Depending on the timbre of the heard noise the diffuse traffic was classified as for example: "bus diffuse" or "car diffuse". The same goes for passing vehicles. It was always tried to identify the specific source of the passing traffic event. This means the classes for this were for example: "passing bus", "passing car", "passing scooter", "passing bicycle". There are also classes such as, for example, "departing bus", "arriving bus". Sometimes there is also background noise in the recordings that is hard to trace back to a specific source. Depending on the level of this noise it was classified as "city noise" or "city silence" (meaning: as silent as the city can get).

The background in a certain location or recording was usually annotated as consisting of multiple "layers". When a recording contains chirping birds, traffic in the distance and murmuring, the choice could have been made to classify this combination as being one distinct type of background sound, for example called "park noise". It was chosen not to do this but to identify the different "layers" of the background, e.g., in this example there are annotations for "chirping birds", "car diffuse" and "murmuring". Annotating the recording like this makes it possible to check for the impact of each of these layers on core affect separately.

This procedure resulted in 56 classes of sounds.

2.4 Data analysis

For each class provided by the annotations a percentage of presence of that class in each recording was calculated. This was done by taking the length in seconds of the annotations of that class in a recording and dividing by the total length in seconds.

The answers the participants provided about the applicability of the eight descriptions to the sound environment, were used to calculate four points on the axes of the circle in Figure 2 (one point on each axis). From these points, a sine was generated. For each recording the sine "assumed" by these four points was matched against 360 different sines. According to the phase of the assumed sine and each of the 360 sines, the best fitting sine from the 360 is selected. This method renders a single number on a continuous scale between zero and nine for each recording, indicating where the

recording is located on the circle of Russell (1980). This single number was taken as the value of core affect for that recording.

To discover whether the classes have an influence on core affect, the presence percentages of the classes were correlated with the values of core affect. To check if weather conditions influenced the results, a multiple linear regression was performed with core affect as dependent variable and the weather data as independent variables. Correlations with each separate weather variable as independent variable and core affect as dependent variable were also calculated. To find out if the indications of how well activities were suited for an environment had a relation with core affect, correlations for each activity with core affect were calculated. A repeated-measures ANOVA was performed to check for an effect of location on core affect with location (5 levels: five locations in Groningen) as a within-subject variable..

3 Results

Temperature range during the experiment: 9°-27°, mean temperature = 17°. Wind range: 10-80, mean = 37. Sun range: 0 - 100, mean = 49. Light range: 20 - 100, mean = 72. Visibility range: 75 - 100, mean = 98. Rain range: 0 - 87, mean = 9. Indications of how well the six activities could be performed: range for "taking a nap": 0-100, mean = 46; range for "reading a book": 0-100, mean = 54; range for "having an intimate conversation": 0-100, mean = 61; range for "having a conversation about the weather": 15-100, mean = 76; range for "thinking about a difficult problem": 0-100, mean = 55; range for "forgetting about your stress": 0 - 100, mean = 59.

For seven classes a relation to core affect was found, mean core affect for the recordings that contained these classes is shown in figure 4. Mean core affect for every location is shown in figure 5. A one-way repeated measures ANOVA for the effect of location on core affect with location (5 levels: five locations in Groningen) as a within-subject variable showed no significant results, $F(1,46)=0.02$, $p>.05$.

Four out of the 56 classes of sounds showed a marginally significant ($p<.10$), positive correlation to core affect. The percentage of presence of that class to the activity axis of core affect (see Table 2 and Figure 5a-d).

Table 2: marginally significant, positive correlations between the percentage of presence of these classes and core affect, pearson's correlation coefficient r with 48 degrees of freedom

Class	r(48) =	p =
Passing scooter	.27	.05576
Siren ambulance	.27	.05774
Departing bus	.25	.07909
Squeaking brake	.25	.08518

For three out of the 56 classes of sounds, there was a significant (p<.05), positive correlation between core affect and the percentage of presence of that class to the activity axis of core affect (see table 3 and figure 5e-f).

Table 3: significant, positive correlations between the percentage of presence of these classes and core affect, pearson's correlation coefficient r with 48 degrees of freedom

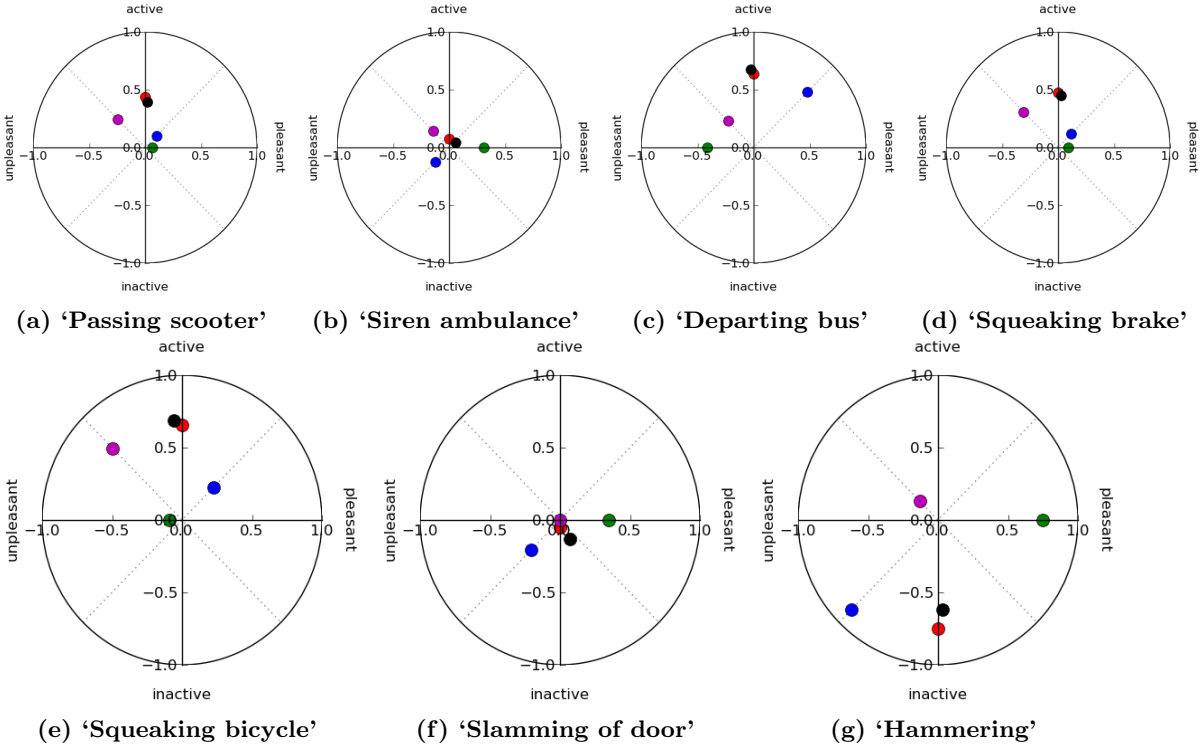
Class	r(48) =	p =
Squeaking bicycle	.32	.02284
Slamming of door	.32	.02356
Hammering	.31	.02654

Multiple linear regression for the relation between combinations of classes of sounds and core affect showed no significant results. Multiple linear regression for the relation between weather and core affect showed no significant results. No significant correlation between any separate weather variable and core affect was found. No significant correlation between any activity and core affect was found.

A one-way repeated measures ANOVA showed a main effect of location on the activity "forgetting about your stress" with location (5 levels: five locations in Groningen) as a within-subject variable, $F(1,46)=4.1$, $p=0.048$. No effect of location on any of the other activities was found.

4 Discussion

The goal of this study was to explore how people evaluate sound environments in the real world.



(a) 'Passing scooter' (b) 'Siren ambulance' (c) 'Departing bus' (d) 'Squeaking brake'

(e) 'Squeaking bicycle' (f) 'Slamming of door' (g) 'Hammering'

Figure 5: Mean core affect of the classes that show a positive correlation with core affect. The red circle indicates the position on the eventful-uneventful axis, the green circle indicates the position on the pleasant-unpleasant axis, the blue circle indicates the position on the exciting-monotonous axis, the purple circle indicates the position on the chaotic-calm axis and the black circle indicates mean core affect

More specifically this study focused on how particular classes of sounds in outdoor urban soundscapes influence core affect. What was found were four classes of sounds that show a marginally significant positive correlation with core affect on the activity axis and three classes of sounds that show a significant positive correlation with core affect on the activity axis. This suggests that these classes of sounds influence the way people feel. The location for these seven classes on the circle of core affect indicate how these classes might influence core affect. Causality is not proven however. All of these seven sounds stick out in a sound enironment and can inspire action. The sounds of the siren of an ambulance, a passing scooter, a squeaking break, a squeaking bicycle or a departing bus could, for example, indicate that traffic is coming and you might have to get out of the way, raising your activity. This does not explain the place on the circle of slamming doors and hammering however. It also does not explain why there is such little effect on the pleasantness axis. More data will be needed to be able to say more on this.

The fact that no effect of location on core affect was found and that all five locations are located close together on the activity axis of core affect, without showing much spread on any of the other axes, indicates that the locations and thus the sound environments may not have been variable enough to evoke a wide range of different core affects. The fact that the locations were chosen to be in walking distance of each other might have contributed to this. The participants transitioned gradually from one environment to another while walking and there might have been overlapping elements in the sound environments due to their nearness. Because of this the participants might not have shown as much range in core affect as was

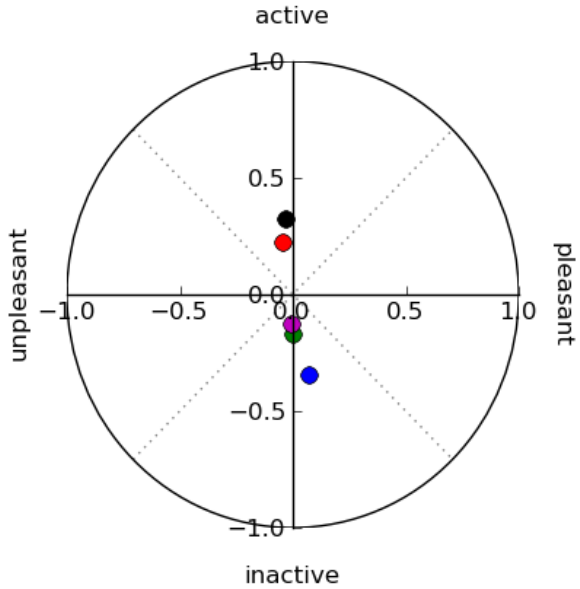


Figure 6: Mean core affect for the five locations, the black circle indicates mean core affect for location 1 on the map, the red circle indicates mean core affect for location 5 on the map, the purple circle indicates mean core affect for location 3 on the map, the green circle indicates mean core affect for location 2 on the map, the blue circle indicates mean core affect for location 3 on the map

hoped. That there is only one activity that shows an effect of location means that either the locations were all suitable for a range of different activities or the activities were not variable enough.

Since no correlation between any of the activities of core affect was found and core affect showed no effect of location means that no statements about the suitability of a location for a particular activity can be made. Due to the aforementioned recording problems and time constraints, the dataset that was used was relatively small and contained annotations that did not fully reflect the sound environments. With a larger and more representative dataset, more data on the current classes will be available and relations of more of these classes and combinations of classes to core affect may be found. A larger dataset could also provide more representative and complete sets of classes. The annotation procedure resulted in 56 classes but this does not mean that there are 56 classes of sounds and that all sounds in the city can be classified into these 56 classes. They represent what was audible in the current set of recordings. Statements about the suitability of locations for particular activities may also be possible with a larger dataset.

Considering the recording problems and time constraints, the results are promising for future research. The fact that with these restrictions it was already possible to find classes of sounds that show a relation to core affect shows the potential applicability of core affect to this kind of study. More elaborate studies could be fruitful and provide context to the current findings. In addition to the classes that were found, this study produced insights in how future studies into the relationship between sound environment and core affect can be conducted in a better way in the form of the recording protocol that was based on the shortcomings of the recording procedure in this study. If this improved recording protocol is used in a repeat study with more participants and more varied sound environments, more insights in what classes of sounds influence core affect in which way could be gained. To reduce subjectivity and improve on validity, the classes could be defined by people that are impartial to the study or defined in the same way they are defined now but rated on appropriateness by a jury.

In addition to future research into classes of sounds that influence core affect there are other possibilities for research into the relationship between sound and core affect with the same method of obtaining experimental data. On such data, research more along the lines of Raimbault et al. (2003); Zhang & Kang (2007); Broers (2011) could be conducted to find physical aspects of the sound environment that show correlations with core affect. Physical aspects that could be thought of are, for example: the ratio of foreground to background noise, the frequency of background noise and many others.

Future research is also needed to place the current results in a broader context. It is unclear how core affect evaluation is affected by conscious listening versus hearing. A method to determine core affect without explicitly asking participants about their feelings should be utilized. Future research is also needed to determine the relative influence of audition (and within that the relative contributions of conscious listening and hearing) on core affect.

People are not just exposed to sound when judging an environment in real world environments but also to visual, olfactory and kinesthetic information. To determine how sound contributes to core affect it is necessary to know its relative contribution to core affect compared with the other senses.

All of this future research might provide a great insight in the emotional state of humans in relation to their surroundings. It could define how specific elements of the surroundings, this being sonic, visual or other elements, specifically affect mood and emotion. This could be used to improve the standard of living in cities all over the world.

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Ik ben Henk Borghols, derdejaars student Kunstmatige Intelligentie aan de rijksuniversiteit Groningen. Dit onderzoek doe ik in samenwerking met de RuG en INCAS^3 in Assen.

Dit onderzoek gaat over de beleving van geluidsomgevingen. Ik wil je vragen om goed te luisteren op de verschillende plekken die we gaan bezoeken. Daarna wil ik je een paar vragen stellen die met de beleving van het geluid op deze plek te maken hebben. Het doel van het onderzoek is het geven van adviezen voor verbetering van de geluidsomgeving voor de plek en de activiteiten die men daar zou willen doen. Alle resultaten zullen anoniem worden verwerkt.

Vul hieronder je persoonlijke gegevens in.

Leeftijd:

Geslacht:

Als je geïnteresseerd bent in de resultaten van het onderzoek kun je hieronder je e-mail adres invullen.

E-mail:

Luister goed naar de omgeving. Schrijf de geluiden op die je hoort.

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Kruis voor elk geluid aan welke woorden er bij passen.

Nr. van geluid	Opvallend	Karakteris-tiek voor de omgeving	Plezierig	Onkarak-teristiek voor de omgeving	Onplezierig
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
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Noem een of meerdere activiteiten waar deze plaats/situatie geschikt voor is.

Hoe goed zijn deze omschrijvingen van toepassing op je huidige geluidsbeleving?

	Geheel niet van toepassing	Niet van toepassing	Neutraal	Van toepassing	Zeer van toepassing
Actief, Druk, Levendig, Dynamisch, Veelbewogen	|----------|----------|----------|----------|				
Extreem, Rommelig, Onthutst, Chaotisch, Verward	|----------|----------|----------|----------|				
Natuurlijk, Warm, Prachtig, Comfortabel, Gezellig	|----------|----------|----------|----------|				
Simpel, Stil, Kalm, Bedaard, Onopvallend	|----------|----------|----------|----------|				
Verschrikkelijk, Onaangenaam, Irriterend, Vervelend, Afschrikwekkend	|----------|----------|----------|----------|				
Expressief, Levend, Prikkelend, Fascinerend, Interesse-opwekkend	|----------|----------|----------|----------|				
Onbewogen, Onveranderlijk, Immobiel, Passief, Stilstaand	|----------|----------|----------|----------|				
Levenloos, Oninteressant, Monotoon, Expressieloos, Saai	|----------|----------|----------|----------|				

Hoe goed zijn deze woorden van toepassing op je huidige geluidsbeleving?

	Geheel niet van toepassing	Niet van toepassing	Neutraal	Van toepassing	Zeer van toepassing
Druk	|----------|----------|----------|----------|				
Plezierig	|----------|----------|----------|----------|				

Hoe goed zou je deze activiteiten uit kunnen voeren op een aangename zomerdag met je huidige geluidsbeleving?

	Erg slecht	Slecht	Neutraal	Goed	Erg goed
Een dutje doen	|----------|----------|----------|----------|				
Een boek lezen	|----------|----------|----------|----------|				
Een privé gesprek voeren	|----------|----------|----------|----------|				
Een gesprek voeren over koetjes en kalfjes	|----------|----------|----------|----------|				
Nadenken over een moeilijk probleem	|----------|----------|----------|----------|				
Je stress even vergeten	|----------|----------|----------|----------|				

Dit is het einde van de vragenlijst voor de eerste locatie.