Inward

The silence is within

The pattern language set
\ Volume 01
\ Anne van den Berg

This set of patterns is related to the report 'Inward', as part of the graduation project of Urbanism at the TU Delft.

This set consists of 5 parts
(1) Background information
(2) Explanation of the pattern language
(3) Explanation how to work with the set
(4) An overview of the patterns
(5) The patterns (24x)

Related subquestion
Integration | (TD-01) What are the elements that link the connectivity between psychological research and urban design?

What do you need to know?

The following patterns are divided into 8 categories. These categories represent the psychological components that are formed by a variation of literature studies, fieldwork, observations, interviews with residents and conversations with sound-experts.

Each pattern is connected to a spatial input, that relates to the aspects of space. The spatial input is divided into sound-based input (characteristics of sound), performance-based input (sound in relation to space) and context-based input (sound in relation to surrounding soundscapes).

Combining the psychological components and spatial input forms a generalized set of indicators (the patterns) that function as guiding language for designing with sound. However they cannot predict a certain perception, it makes it easier to link psychological well-being to interventions in space and, thereby, gives an answer to the subquestion;

(TD-01) What are the elements that link the connectivity between psychological research and urban design?

Components of perception

1.Contrast

A strong contrast creates awareness of sounds and makes people alert. A low contrast sequence of sounds can become a background sound or an “invisible” gradual sequence of sounds. Both categories can be perceived as positive or negative and, thereby, depend on the situation, context, and the message the sound is used for.

2. Expectation

The function of space gives implications for what sounds people could expect. During a concert, loud mechanical sounds are expected and thereby easier accepted than the same loud music in a quiet park. Expectation is not only related to the function but also the purpose the user has for visiting the area.

3. Control

Control indicates what the perceiver can change about the sound they hear. This is done by, for example, distracting from it, creating it or turning it off. In this pattern language, control is about interventions in the public space and thereby does not focus on noise-cancelling objects such as headphones.

4. Continuity

Continuity indicates the role of sound in its context. Some sounds are always there; other sounds are new and emphasize a change of activities or a dangerous situation.

Possible perception

1.Contrast
Surprisement, attraction, amazement, relief

2. Expectation
Recognition, trust, acceptance

3. Control
Trust, security, focus, confidence.

4. Continuity
Understanding, comfort, calmness

5. Variation
Amusement, excitement, joy, stress, fascination

6. Exposure
Retreat, calmness, inpiration

7. Distance
Trust, acceptance, security

8. Time
Fulfillment, relief, excitement.

5. Variation

Variation is about the composition of sound. This part of perception is about hearing a set of sounds that match or clash with the situation.

6. Exposure

Exposure is about the duration of hearing a specific sound or a set of sounds. A short exposure does not have the same effect on psychological well-being as a long exposure. The effect itself is dependent on the type and level of sound and the coping ability of the user.

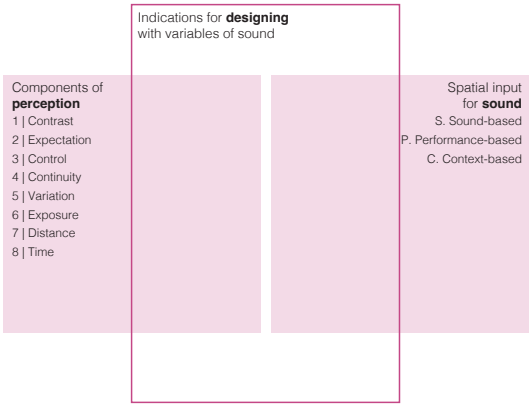
7. Distance

The distance between the sounding object and the user gives insight into how loud the sound reaches the perceiver and if the sound becomes background noise or a dominant factor.

8. Time

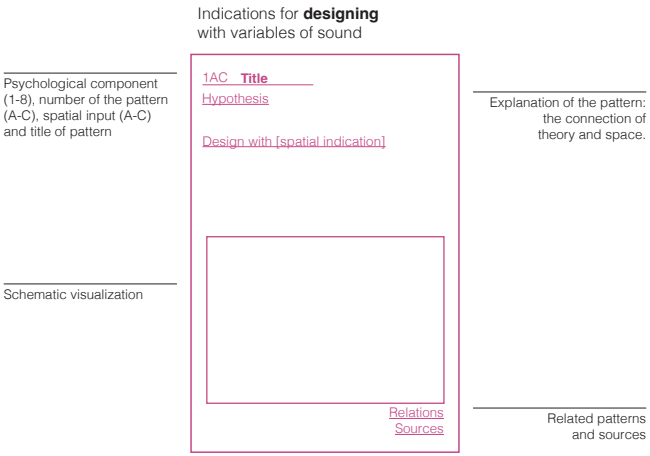
Time and sound have a strong connection when looking at the experience of sound. Some sounds are completely accepted throughout the day, while the same sound becomes noise at night. Besides, the season and weather show a differentiation as well.

Why this pattern language?



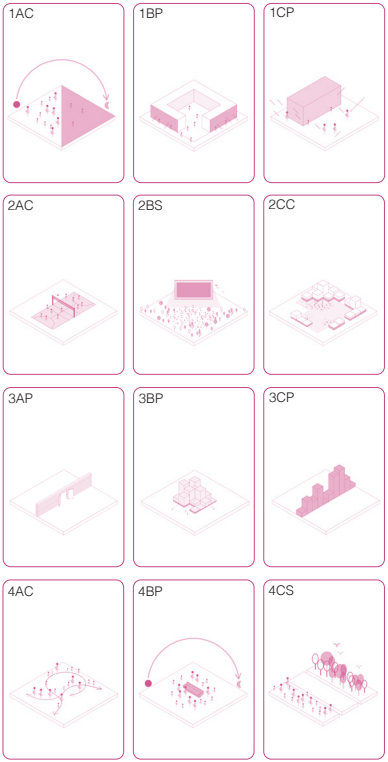
In this set, you can find a bundle of patterns focusing on the perception of sound. These patterns connect the theory of psychology to possible interventions in urban design.

How does it work?



1. All patterns have a title which combines a component of perception (theme) and spatial input.
2. In the hypothesis, the combination of the component and spatial factor is described. This combination does not give a design solution, but possibilities for designing.
3. The patterns show the relationships with other patterns, which emphasizes possible combinations or frictions during the design.

Overview



Patterns

1.Contrast

1AC Breaking the beat

1BP The sounding barrier

1CP Tap-dancing

2. Expectation

2AC Sound forecasting

2BS It is what it sounds like

2CC Using highlighter

3. Control

3AP Active Noise Control

3BP Hey mister DJ.

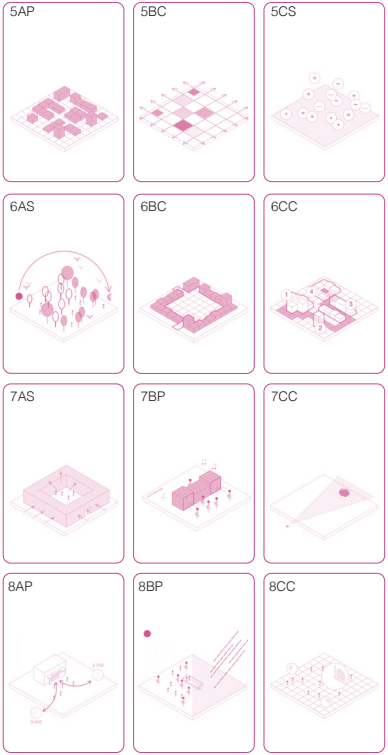
3CP Adrenaline zones

4. Continuity

4AC The soundwave

4BP Waiting rooms

4CS Change your tune!



Patterns

5. Variation

5AP Urban conductors

5BC Scaling tunes

5CS Leading genres

6. Exposure

6AS 'Green-energy'

6BC Cultural accents

6CC Track 6/18

7. Distance

7AS Noise-canceling

7BP The choir and the audience

7CC See the silence

8. Time

8AP (Anti-)climax

8BP When the beat drops

8CC Daily dose

Indication for designing A

Breaking the beat // Rhythm

Component of perception
1 | Contrast

Spatial input for sound
C | Context-based

1AC

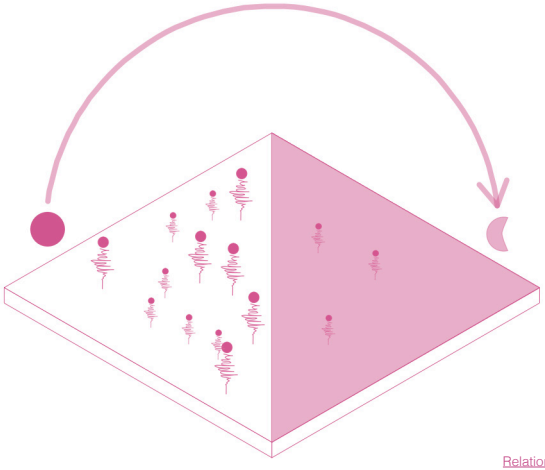
1AC Breaking the beat

Hypothesis

Rhythm in relation to contrast can be addressed in time and sequence. 1. Time reveals rhythms by times per week, differences in day and night, and seasons; 2. A sequence suggests a recurring rhythm; The contrasts in these rhythms reveal information about the use and functioning of space and sound.

Designing with rhythm

Work with clear rhythms estimated on moments of use and their related sounds. The preferred contrast is based on function, target groups, weather, rush hours, and the space's position in its context (the sequence).



Relations

2AC/4AC/4BP/5AP/6BC/6CC/8CC

Sources

(Cage, J.,1961, p.29,63)
(Tielens, G., 2013) (Havik, K., & Tielens, G., 2013, p.35,47)
(Grillner, K., & Hellström, B., 2019, p.83)

Indication for designing B

The sounding barrier // Urban form

Component of perception
1 | Contrast

Spatial input for sound
P | Performance-based

1BP

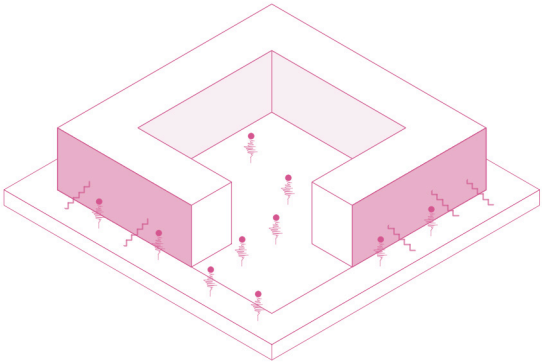
1BC The sounding barrier

Hypothesis

The urban form of a building has a great effect on the reverberation and attenuation of sound. Therefore, the urban composition suggests the direction of sound. The urban block creates the most contrast by keeping sounds within and blocking the sounds from outside.

Designing with urban form

Play with urban form to emphasize the direction of sound. It is recommended to work with urban blocks as courtyards to increase contrast; these blocks function as a shelter for the sounds of nature and a barrier to mechanical sounds.



Relations

1CP/2CC/3AP/3BS/5AP/6BC/7BP/7CC/8BP

Sources

(Castro, R., & Carvalhais, M., 2014) (Grillner, K., & Hellström, B., 2019, p.34,78,84)

Indication for designing C

Tap-dancing // Materials

Component of perception
1 | Contrast

Spatial input for sound
P | Performance-based

1CP

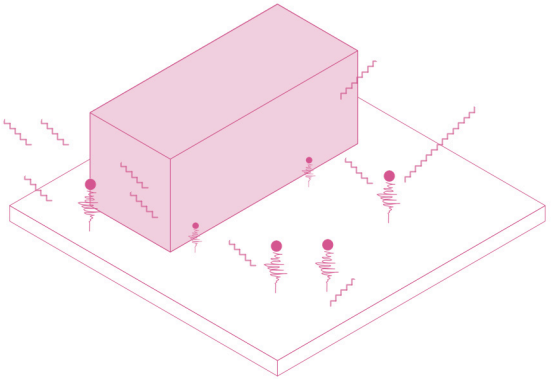
1CC Tap-dancing

Hypothesis

The differentiation in materials is one of the causes of hearable sound contrasts and emphasizes the variety in sound. This has to do with reverberation and attenuation.

Designing with materials

Use contrast in materialization to address a transition in a soundscape or to highlight a cluster of sounds. In the case of a loud area, such as the city center of Rotterdam, design with materials that absorb sound to purposely decrease contrast.



Relations

1BP/2CC/3CP/5AP/6AS/6BC/8BP

Sources

(Luz, A., 2008, p.92,97)
(Schafer, R.,1993, p.58,59,162).

Indication for designing A

Sound forecasting // Function

Component of perception
2 | Expectation

Spatial input for sound
C | Context-based

2AC

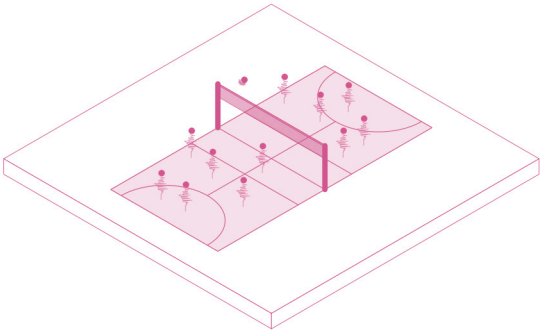
2AC Sound forecasting

Hypothesis

The sounds heard should reflect the (surrounding) function of the area. This implies the acceptance of sound and the perception of noise. A more commercial area contains more vibrant sounds; a more residential area contains mostly human sounds.

Designing with function

Reduce the sounds that do not fit the function and make the sounds of the main function dominant. In the case of temporary activities, cluster the sounds into specific timeframes so that people can predict the increase and type of sound.



Relations

2BS/3AP/3BP/3CP/4BP/
4CS/5CS/6AS/6BC/7AS/7BP/8AP

Sources

(Castro, R., & Carvalhais, M., 2014) (Author, 2021)

Indication for designing B

It is what it sounds like // Purpose

Component of perception
2 | Expectation

Spatial input for sound
S | Sound-based

2BS

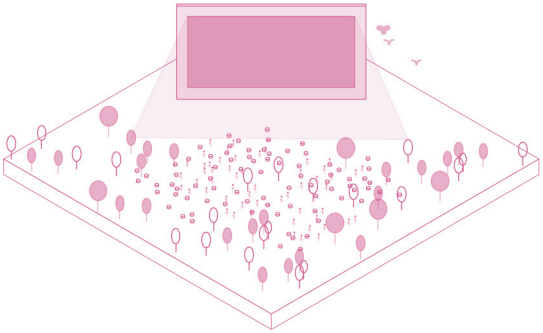
2BC It is what it sounds like

Hypothesis

The perception of sound is not only affected by the function of the scape, but also by the purpose the user has within this soundscape. With this, the diversity of sound and the source of sound are important indicators that show the perception of the individual user.

Design with purpose of function

Design the space in such a way that the user immediately understands how to use it. To do this, design with recognizable sounds and a clear focus on a set of sounds within the same category. For example, during an outdoor cinema night, the user wants to watch the movie. The sounds of the movie should become the dominant sound instead of other sounds in its context.



Relations
2AC/2CC/3AP/3BP/3CP/4AC/
4BP/4CS/5BC/5CS/6BC/7AS

Sources
(Author, 2021)

Indication for designing C

Using highlighter // Aesthetics

Component of perception
2 | Expectation

Spatial input for sound
C | Context-based

2CC

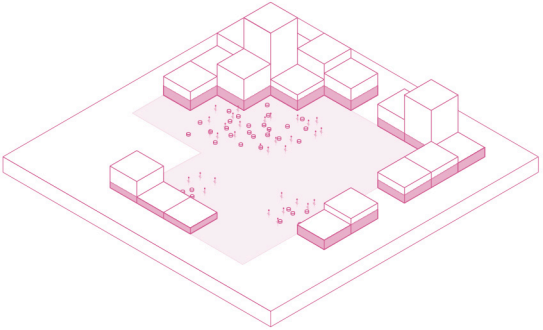
2CC Using highlighter

Hypothesis

The physical appearance influences the expectation of sound. This has to do with the design elements of the area, such as materials and greenery, For example, a paved square is expected to be more formal than a field of grass.

Design with aesthetics

Consider the type and texture of the materialization in relation to the function of the space. For the calm soundscape, it is recommended to work with soft and natural materials, such as grass, gravel, and wood. This emphasizes an expectation of calmness.



Relations
1BP/1CP/2BS/3CP/4AC/
4BP/4CS/5BC/6AS/6BC/6CC

Sources
(Castro, R., & Carvalhais, M., 2014) (Author, 2021)

Indication for designing A

Active Noise Control // Publicness

Component of perception
3 | Control

Spatial input for sound
p | Performance-based

3AP

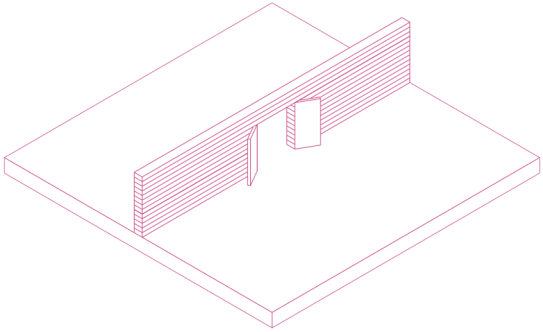
3AP Active Noise Control (ANC)

Hypothesis

The publicness of space shows a gradient in control over sound. A public space contains multiple user groups and less control, while private spaces contain fewer user groups, which enhances control. In a public area, there is more acceptance when new sounds arise, while in a private area, this contrast is less accepted.

Design with publicness

To design with control over sound, the source of sound, the ability to change the sounds, and familiarity with the sounds should increase the more private a space becomes. In public areas like the city center, implementing sounds that people are familiar with is most important.



Relations

1BP/2AC/2BS/3BP/4AC/4BP/5AP/
6BC/6CC/7AS/7BP/7CC/8CC

Sources

(Castro, R., & Carvalhais, M., 2014) (Montgomery, 2015) (de Wit, 2018).

Indication for designing B

Hey mister DJ
// Interaction

Component of perception
3 | Control

Spatial input for sound
p | Performance-based

3BP

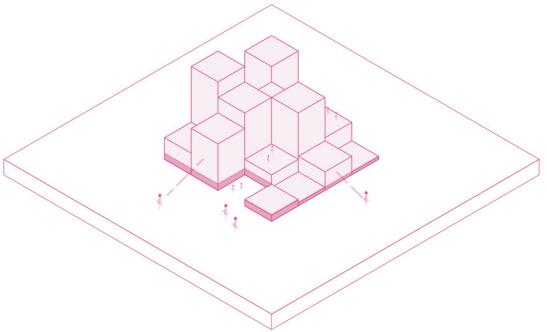
3BP Hey mister DJ.

Hypothesis

The level of interaction is related to choice. The ability to change the scenery and its sounds, and thereby the level of interaction, gives people control over their daily environment.

Design with interaction

It is recommended to facilitate choice in the urban fabric. This means that loud areas should be contained within nearby calm spaces for withdrawal. Vice versa, calm territories should have spaces to interact as well. In this way, people have the ability and control to change their environment quickly.



Relations

1BP/2AC/2BP/3AP/3CP/
4BP/6BC/7BP/8CC

Sources

(Castro, R., & Carvalhais, M., 2014) (Montgomery, 2015).

Indication for designing C

Adrenaline zones // Loudness

Component of perception
3 | Control

Spatial input for sound
p | Performance-based

3CP

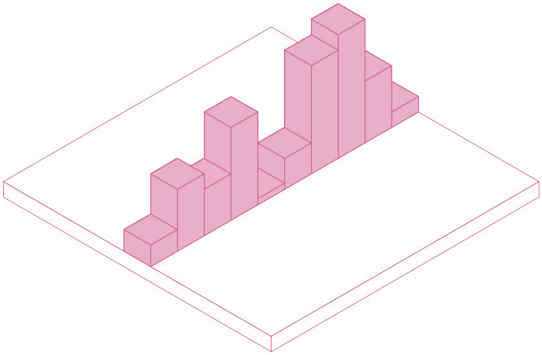
3CP Adrenaline zones

Hypothesis

Frequency and decibels describe how loud the actual area is. The type of sound defines how loud it is perceived to be. A constant exposure to mechanical loudness results in a decrease in well-being and indicates an absence of control in order to change the sounds. However, a temporary event of loudness can be associated with signs of alertness. This can be interpreted as positive and controlled.

Design with loudness

It is recommended to decrease the exposure to mechanical sounds. In areas where this is not possible, such as main traffic roads and the city center, it is beneficial to add (louder) natural sounds; these sounds improve the exposure to the soundscape.



Relations
1CP/2AC/2BS/2CC/3BP/4AC/
4B/4C/5BC/5CS/6AS/7CC

Sources
(Castro, R., & Carvalhais, M., 2014) (Montgomery, 2015).

Indication for designing A

The soundwave // Movement

Component of perception
4 | Continuity

Spatial input for sound
C | Context-based

4AC

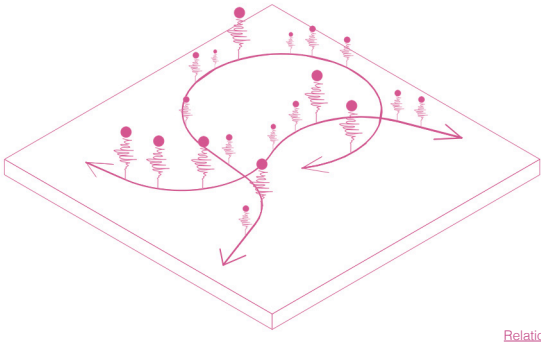
4AP The soundwave

Hypothesis

During a stroll through an area, different sounds come along. These sounds can cross you, be created by you, and accompany you on your journey. This means that the movement and continuity of sounds depend on the context.

Design with movement

It is advised to add a continuous stream of specific sounds during a route or network. This sets the basis for the soundscape people are experiencing and helps in finding their way. When this is not possible, a soundmark can be added to attrack movement to this point.



Relations

1AC/2BS/2CC/3AP/5BC/
6BC/6CC/7AS/7BP/7CC/8AP/8BP

Sources

(Castro, R., & Carvalhais, M., 2014) (Wang, K., 2004, p.42) (Mallgrave, H. F., 2018, p. 3,46)

Indication for designing B

Waiting rooms // Staying

Component of perception
4 | Continuity

Spatial input for sound
p | Performance-based

4BP

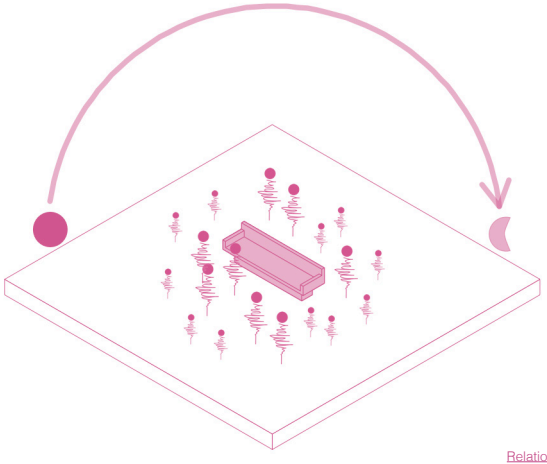
4BP Waiting rooms

Hypothesis

The continuity of sound can be best observed when staying at the same place for a while. Some context-based sounds are always there; some involve specific times or are related to specific events within that location. This explains the sonic identity of the space and the connected perception.

Design with staying

For spaces to stay, it is recommended to design with a variety of calm sounds to improve an inviting character. If the continuous sound is mechanical, position the space to stay somewhere else or add natural elements to create an association with calmness.



Relations
2AC/2BS/2CC/3AP/3BP/3CP/
4CS/5CS/6AS/6BC/7BP/8AP

Sources
(Bosselmann, P., 2014,
p.143, 156)

Indication for designing C

Change your tune! // Dominance

Component of perception
4 | Continuity

Spatial input for sound
S | Sound-based

4CS

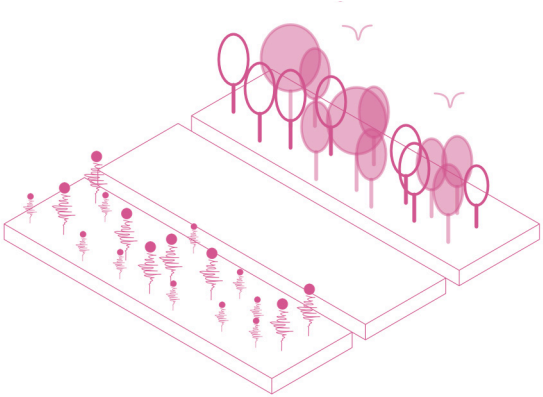
4CP Change your tune!

Hypothesis

The dominant sound eliminates and overrules other sounds and is reflected in specific behaviors and actions. When the dominant sound is a continuous sound as well, it determines the choice to avoid, use, or stay in space.

Design with dominance

The urban landscape determines these dominant sounds, and the dominant sound predicts the use of the landscape. Analyse what dominant sound fits the functional identity on a block-level. This can be different from the dominant sound at the neighborhood and district level.



Relations
2AC/2BS/2CC/3CP/
4BP/5CS/6AS/6BC/7AS

Sources
(Moore, B., 2013, p.226)
(Wang, K., 2004, p.22)

Indication for designing A

Urban conductors // Composition

Component of perception
5 | Variation

Spatial input for sound
P | Performance-based

5AP

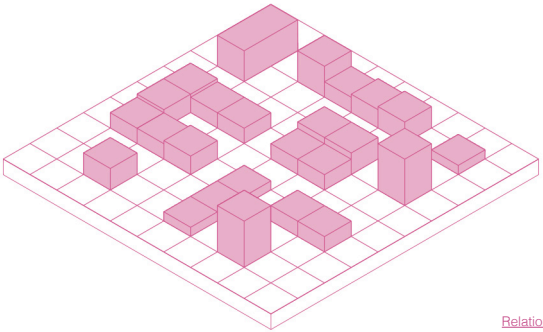
5AC Urban conductors

Hypothesis

A balanced soundscape of inner cities contains a variation of sounds. Variety can be achieved by playing with the spatial composition of volumes and the distribution of sounds.

Design with composition

Play with the urban composition by varying 1. spatial forms and 2. element height. 1. When sounds should be directed in a certain way or lead people to a space, for example, a street, change the elements in the same direction as well and add diversity in heights. 2. When sounds should be blocked or clusters, add volumes and elements that create an ensemble.



Relations
1BP/1CP/3AP/3BP/
5BC/5CS/7CC

Sources
(Castro, R., & Carvalhais, M., 2014) (Wang, K., 2004, p.23,56) (de Wit, s., 2018)

Indication for designing B

Scaling tunes // Networks

Component of perception
5 | Variation

Spatial input for sound
C | Context-based

5BC

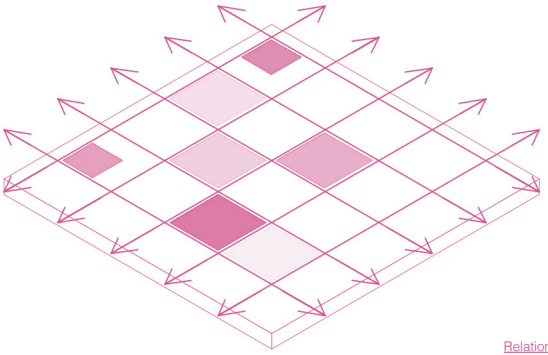
5BC Scaling tunes

Hypothesis

A variation of sound can be achieved by focusing on a diverse network of soundscapes. The transition and position of the soundscape within the urban network indicate changing atmospheres.

Design with networks

The variation of sound within the urban network suggests two elements: 1. Focus on the in-between: the transition zones. These zones are important for the fluency of the changes in urban landscapes and benefit the experience of a place. 2. Focus on a variety of spaces and sounds within the daily network of citizens, to incorporate multiple user groups.



Relations

1AC/2BS/2CC/3CP/4AC/5AP/6BC/6CC/7AS/7BP/7CC/8CC

Sources

(Montgomery, 2015) (Wang, K., 2004, p.23,55,56) (de Wit, S.,2018)

Indication for designing C

Leading genres // Focus

Component of perception
5 | Variation

Spatial input for sound
S | Sound-based

5CS

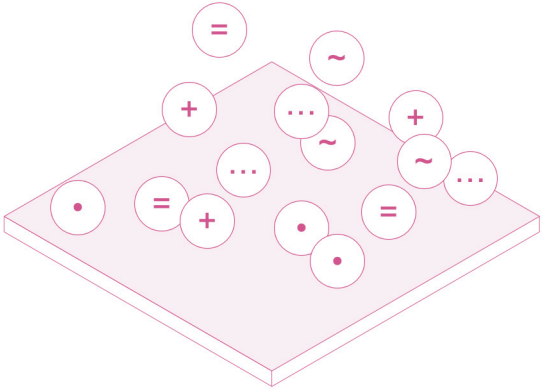
5CC Leading genres

Hypothesis

The focus sound is mechanical, human or natural. Focussing on one category makes clear what the identity of the place is and how the sound is perceived in general, but is built up from multiple sound elements. This emphasizes that variation can be achieved within one category without excluding other categories.

Design with focus

The variation of sound and the focus sound category are dependent on the purpose of the area, the context, and the possible design elements that can be the source or the attraction of sound. For the calm soundscape, work with a focus on the sounds of nature, wherein a variety of sounds can be facilitated. For louder areas, focus on human sounds.



Relations
2AC/2BS/2CC/3CP/4BP/
4CS/5AP/7AS/8AP
Sources
(Schafer, R.,1993) (Wang, K.,
2004, p.23,56)

Indication for designing A

‘Green energy’ // Vegetation

Component of perception
6 | Exposure

Spatial input for sound
S | Sound-based

6AS

6AS ‘Green energy’

Hypothesis

Vegetation has a beneficial effect on the psychological well-being of humans and can absorb sounds. The longer one is exposed to nature, the greater the positive mental effects. Accessible green for all citizens would affect their psychological well-being.

Designing with vegetation

In order to improve and increase the amount of nature in the city, calm soundscapes should be accessible and implemented in the daily environment of people.

Relations

1CP/2AC/2CC/3CP/4BP/
4CS/7BP/7CC/8BP/8CC

Sources

(Castro, R., & Carvalhais, M., 2014) (Montgomery, 2015) (Ulrich et al., 1991).

Component of perception
6 | Exposure

Indication for designing B

Cultural accents // Context

Spatial input for sound
C | Context-based

6BC

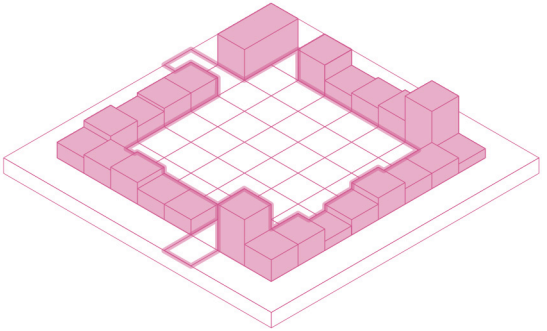
6BC Cultural accents

Hypothesis

The way people perceive sound is dependent on their context. Exposure of particular sounds is context specific and is therefore part of the location. This limits changing sound by preserving the functionality of the context and has consequences for the permanent exposure of sound in space.

Designing with context

The exposure in a specific context necessitates a context-based approach. The longer the exposure, the more differentiation and choice in sounds are needed. The shorter the exposure, the clearer the context and related sounds should be.



Relations
1BP/1CP/2BS/2CC/3AP/3BP/
4AC/4CS/5BC/6CC/7CC/8CC

Sources
(Castro, R., & Carvalhais, M., 2014) (Montgomery, 2015) (Ulrich et al., 1991).

Indication for designing C

Track 6/18 // Sequence

Component of perception
6 | Exposure

Spatial input for sound
C | Context-based

6CC

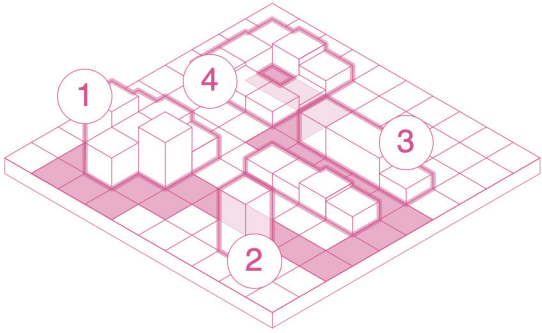
6CC Track 6/18

Hypothesis

A sequence leads you from one place to the other. Spatially, this is the transition from the public sphere to the private sphere. When considering sound, these transitions can be heard as well and play an important role when deciding to enter the next space in the sequence. The spatial transition is, in that way, a mental transition as well.

Designing with sequences

It is recommended to design a gradual transition of sounds within the sequence. If this is not possible and the exposure to the specific space can take a long time (for example, in a shopping area), it would be beneficial to add some contrasting (but readable) spaces that foresee calm spaces as well.



Relations

2CC/3AP/4AC/4BP/
5BC/6BC/8CC

Sources

(Montgomery, 2015) (de Wit, 2018).

Indication for designing A

Noise canceling // Distraction

Component of perception
7 | Distance

Spatial input for sound
S | Sound-based

7AS

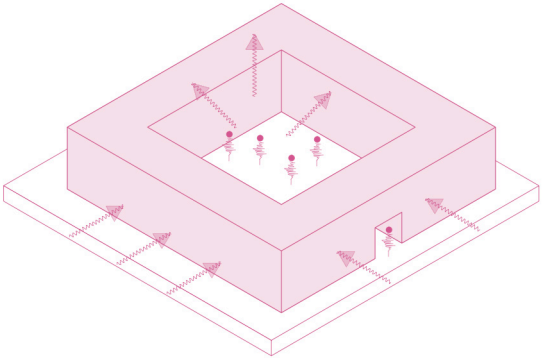
7AS Noise-canceling

Hypothesis

Standing next to a sound overrules other sounds and, based on the type of source, creates a wanted or unwanted feeling. Standing far away from a sound, on the other hand, can reduce the absorbed decibel and turn it into a background sound, such as white noise. This ability is connected to control, but also to recognizing the source of sound.

Design with distraction

Create a distance from (unwanted) sound in territories of silence, which are mainly residential areas, to maintain the calm identity. This can be a distance itself or an urban block that creates a sounding distance. Create distraction from unwanted noise in louder areas and areas where distance is not an option. Distraction can be implemented by adding calm elements such as streaming water.



Relations
2AC/2BS/3AP/4AC/
4CS/5BC/5CS

Sources
(Castro, R., & Carvalhais, M., 2014) (Author, 2021) (Wang, K., 2004, p.15,21)

Indication for designing B

The choir and the audience // Users purpose

Component of perception
7 | Distance

Spatial input for sound
P | Performance-based

7BP

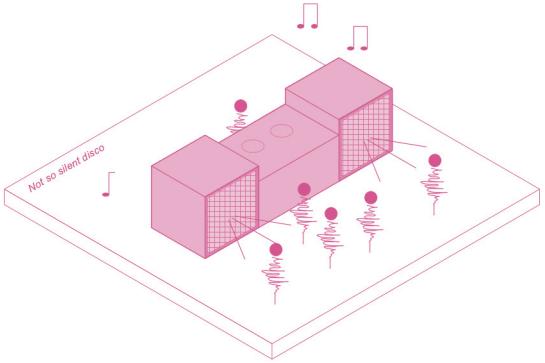
7BP The choir and the audience

Hypothesis

The user of the space has a certain goal they want to achieve.This goal influences the perception and acceptance of sound. When the user makes the sound themselves, the sound becomes part of the goal. In contrast, when the user hears other sounds creating friction with the purpose, the acceptance level lowers.

Design with users purpose

Designing with the purpose of use can be done in two directions: 1. Establish a specific target group or purpose and include sounds that they would accept or expect. 2. Include a variety of sounds that correspond to various uses and user groups. It should be taken into account that this could create conflicts of use and sound.



Relations

1BP/2AC/2BS/2CC/3AP/
3BP/4AC/4BP/5BC/6AS

Sources

(Castro, R., & Carvalhais, M., 2014) (Author, 2021) (Wang, K., 2004, p.15,21)

Indication for designing C

See the silence // Sight

Component of perception
7 | Distance

Spatial input for sound
C | Context-based

7CC

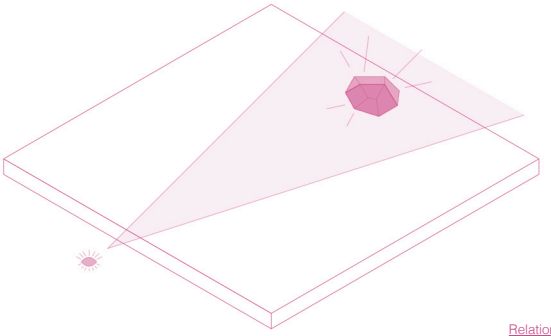
7CC See the silence

Hypothesis

The acceptance and expectation of sound are related to distance and sight. When a sound is remote from one's immediate surroundings, the invisible place of reference causes confusion. Visible sounds, or visible activities that generate specific sounds, are more widely accepted because it is clear where they come from.

Design with sight

The vision of sound combines two senses. The design tasks hereby are; 1. Make visible what you hear and 2. Hear what you see. With this, locate generated sounds at strategic locations, so that both interventions form a complete perception.



Relations

1BP/3AP/3CP/4AC/
5AP/5BC/6AS

Sources

(Castro, R., & Carvalhais, M., 2014) (Montgomery, 2015) (Wang, K., 2004, p.15,21)

Indication for designing A

(Anti-)Climax // Function

Component of perception
8 | Time

Spatial input for sound
P | Performance-based

8AP

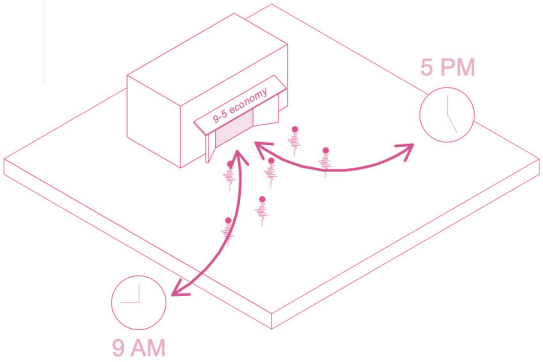
8AP (Anti-)Climax

Hypothesis

Functions lead to a set of expected sounds. The duration of these sounds is relevant to predicting the experience. For example, natural sounds are related to the function of a park and can be perceived positively for a long period of time. A club's generated mechanical sounds, on the other hand, have a shorter preferred exposure to the human mind.

Designing with function

A function has peak moments in use and thereby peak moments in generating sound. In a mixed-use area, it is beneficial to minimize the overlapping peak-hours of several functions, such as nightfunctions and dwellings. In residential areas, incorporate day-functions to maintain a calm or lifely atmosphere during the day.



Relations
2AC/2BS/4AC/4BP/5CS

Sources
(Montgomery, 2015) (Wang, K., 2004, p.13)

Indication for designing B

When the beat drops // Weather

Component of perception
8 | Time

Spatial input for sound
P | Performance-based

8BP

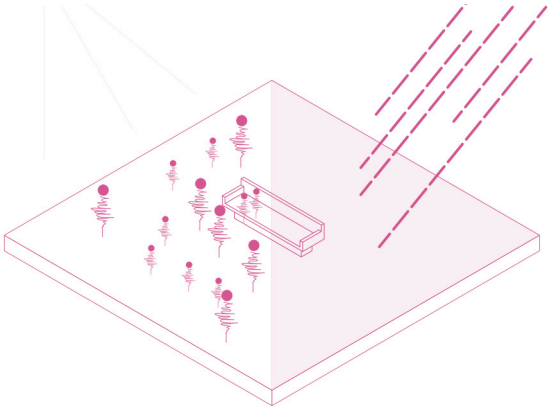
8BP When the beat drops

Hypothesis

Weather is a time lapse or sound lapse that repeats in a cyclus, independent of the user or space (at the region scale level and lower). Weather relates to different activities and behaviors and thereby generates different sounds. With this, a space can be highly used in spring, while the space becomes a “no man’s land” in winter.

Designing with weather

In order to connect sound to weather, seasons are part of the permanent design. The variation of spatial elements is integrated with the variety of sounds, such as a canopy to shelter from the rain or sun or an open space to create wind circulation during hot summer days.



Relations

1BP/1CP/2AC/4AC/4BP/6AS

Sources

(Montgomery, 2015) (Wang, K., 2004, p.13, 45)

Indication for designing B

Daily dose // Daily-life

Component of perception
8 | Time

Spatial input for sound
C | Context-based

8CC

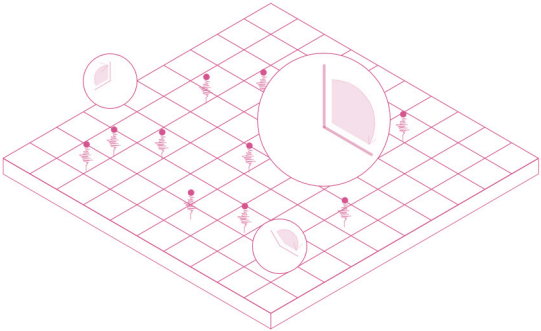
8CC Daily dose

Hypothesis

The daily rhythm of citizens is divided into several activities. The morning and evening rush from home to work and from work to home create peak sounds at specific moments in the day, even though the space could be a silent spot the rest of the day. Besides, the weekends and the weekdays create contrasts in the sounds of space as well.

Designing daily life

The sounds of daily life activities can be predicted and expected. Be creative with the combination of sounds and the times at which they occur. The distribution of sound implies two aspects: 1. Use routes and movements that suggest peak hours. 2. Arrange daily activities in strategic locations. These spaces become clusters of lively soundscapes during the day, while the routes become lifely rhythms within a calm atmosphere.



Relations
1AC/2CC/3AP/3BP/4AC/
4BP/6AS/6BC/6CC

Sources
(Montgomery, 2015) (Wang, K., 2004, p.13)