TOWARDS
HUMAN
CITIES

TOWARDS HUMAN CITIES

HOW CAN ARCHITECTS DESIGN FOR HUMAN WELLBEING IN A GROWING URBAN ENVIRONMENT BY TRIGGERING POSITIVE EMOTIONAL RESPONSES

Eli-Anne Gjøs / Master Thesis 2024
Examiner: Meta Berghauser Pont / Supervisor: Gianna Stavroulaki
Chalmers University of Technology / Department of Architecture and Civil Engineering

TOWARDS HUMAN CITIES

HOW CAN ARCHITECTS DESIGN FOR WELLBEING IN A GROWING URBAN ENVIRONMENT

Master Thesis 2024 by Eli-Anne Gjøs
Chalmers University of Technology
Department of Architecture and Civil Engineering
Programme: Master of Architecture and Urban Design

Examiner: Meta Berghauser Pont
Supervisor: Gianna Stavroulaki

CHALMERS
UNIVERSITY OF TECHNOLOGY

"THE REAL PROBLEM OF HUMANITY IS THE FOLLOWING:
WE HAVE PALEOLITHIC EMOTIONS;
MEDIEVAL INSTITUTIONS;
AND GOD-LIKE TECHNOLOGY."

Wilson, O. E, 2009

ABSTRACT

The built environment is proven to impact human wellbeing and it is therefore crucial to understand how humans are affected by what is built. Research shows that our built environment triggers emotional responses in us, that can in the long term have negative impacts on our mental health. This issue has already been highlighted in the past by architects, scholars and urbanists, especially in relation to the effects of modernist architecture. However, concrete architectural strategies to enhance the wellbeing and counteract negative impacts of the built environment are still lacking. This thesis investigates how humans are affected by the built environment with a focus on the emotional responses triggered by specific spatial qualities, and proposes architectural strategies to enhance positive responses and counteract the negative. The main purpose of the thesis is to create an understanding of how architects can improve the wellbeing of the growing urban population by designing urban environments with the human cognition such as the visual sensory system in mind, in order to create positive emotional responses in the population in the long term. This is especially important because existing urban environments will densify and expand with 68% of the human population living in cities in 2050. Therefore, this thesis investigates: How can architects promote human wellbeing in a densifying and growing urban environment by designing urban architecture that triggers positive emotional responses in humans? Through the analysis of human-centered architectural theories, practice perspectives, research and theories from the field of cognitive architecture, architectural principles will be extracted and synthesized to form architectural strategies in multiple scales that contribute to the purpose outlined above. Further, the relevance, significance and applicability of these principles will be tested through a design case study in a specific urban context in central Gothenburg. The principles will be used to enhance specific spatial and visual configurations identified in the context in multiple scales. Lastly, reflections will be made on their use within the design process and their success in improving the design outcome in relation to the expected emotional responses.

Keywords: Human-centered architecture, cognitive architecture, emotional response, urban environment, wellbeing

AUTHOR BACKGROUND

ELI-ANNE GJØS

CHALMERS UNIVERSITY OF TECHNOLOGY, 2022 - 2024

Master of Architecture and Urban Design

      Sustainable Development and the Design Profession

      Future Visions for Healthcare, Housing and Work 3: Healthcare Architecture

      Design and Communication Tools

      History, Theory and Method: Resistant Architecture 1968 and Beyond

      Public Buildings

      Building on Contexts and Buildings

      Master Thesis Preparation Course

SIMPSON AND BROWN ARCHITECTS, EDINBURGH, 2021 - 2022

      Administrator and Architectural Assistant

UNIVERSITY OF EDINBURGH, EDINBURGH, 2018 - 2021

Bachelor of Art in Architecture

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

BACKGROUND

GROWING CITY POPULATION AND IMPORTANCE OF WELLBEING

The built environment has a significant impact on human wellbeing (Coburn et al., 2017, p. 1521). Facilitating human wellbeing in cities is becoming increasingly important because cities are densifying and expanding which means the urban population is growing. 68% of the human population will live in cities in 2050 which is a substantial increase from 55% today (United Nations, 2018). How can architects ensure the wellbeing of the growing urban population? Architects working in the urban realm must take responsibility to understand how people living in the cities are affected by what is built. Currently, there are no regulations or guidelines concerning mental health or the effect on the brain that architects can use when designing urban architecture, such as those concerning for example sustainability (Azzazy et al., 2020, p. 329). People spend 90% of their lifetime in the built environment (Azzazy et al., 2020, p. 329). It should therefore be of great interest to architects to understand how the growing and densifying built urban environment impacts people to gain a deeper understanding of how to contribute to wellbeing.

LOOKING TO COGNITIVE ARCHITECTURE AND NEUROSCIENCE

Neuroscience can inform architects about how to create comfortable built environments through research regarding human cognitive responses to the built environment (Shynu & Suseelan, 2023, p. 473). The field of cognitive architecture looks to neuroscience to explain how the built environment impacts the human brain and in turn human wellbeing over time (Karakas & Yildiz, 2020, p. 329). Methods that are more related to the field of neuroscience, such as brain imaging and psychophysical measurements are now used for this purpose (Karakas & Yildiz, 2020, p. 240). Karakas & Yildiz suggests that the collaboration of the fields can be valuable to "improve the quality of life of humans and the society" (2020, p. 240). Human emotional responses, even though they are momentary, will suggest long term impacts on psychological wellbeing (Schoenberg et al. 2018). Therefore, the fields of cognitive architecture and neuroscience can help provide evidence to understand the effect of the built environment on the brain (Karakas & Yildiz, 2020, p. 238-239). Ho-

wever, there is little knowledge about how specific design elements impact humans and more research is needed to be able to isolate specific stimulus (Azzazy et al., 2020, p. 231, p. 329).

NEGATIVE EMOTIONAL RESPONSES AND LONG TERM IMPACTS

Research suggests that the human brain reacts positively to natural settings and that nature is phychologically healing (Stigsdotter et al., 2017b), restorative and improves cognitive function (Gidlow et al., 2016), while the built environment creates higher levels of stress and frustration (Azzazy et al., 2020, p. 332). Humans are a product of long-term evolution and perception has evolved to benefit human survival. "We see the 'reality' nature intends us to see, the one that led to our species' survival in the past, which was for almost all of human history, the one outside in the natural world, and not manmade" Hollander and Sussman writes about humans' response to the built environment compared to the natural environment (Sussman & Hollander, 2021, p. 2). How do we trigger emotional responses that reflect those experienced in nature which impacts people positively in the built environment? Negative emotional responses to the environment can have long term negative impacts on human wellbeing. In the book Humanise, architect Thomas Heatherwick presents research from different sources that illustrate how lack of visual stimulation leads to stress, which again heightens cortisol levels and leaves people more prone to illnesses (2023). He also argues that boring buildings cause boredom, which research shows can lead to, amongst other, illnesses such as depression and anxiety (Heatherwick, 2023).

BORINGNESS & LACK OF LIFE

"Where did all the lumps and bumps on buildings go? The shadows, the textures, the three-dimensionality, the high points of light? How did it all become so two-dimensional, so simplistic and devoid of character?" said Heatherwick in a TED talk in 2022 (TED, 2022). Many address dismay and aversion with the architecture that is being built around them. And knowing that it can be harmful should motivate architects to build differently. He calls for architecture to be humanized, and that the term "form follows function" is not enough to justify buildings being solely functional anymore – architectu-

re must provide the function of emotion too (TED, 2022). "An epidemic of boringness" Heatherwick calls it (TED, 2022), and in 2016 architectural theorist and architect Christopher Alexander called it "the spread of ugliness" (Sustasis Foundation, 2016). They both suggest the culprit of boring buildings being modernist architecture with blank facades and little stimulation (Heatherwick, 2023, Galle, 2020, p. 352). Urbanist Jan Gehl suggests that modernism had some positive effects, but he also thinks that it built the life out of places (Gehl, 2010a, p. 47). Modernism came with functionalism in the 1930s which focused more on the physical health aspects of human physiology than aesthetics and came with benefits such as better living conditions and people being able to leave slum areas behind (Gehl, 2010a, p. 43, p. 45). However, it did not consider the impacts of spreading out the population, sprawling out of cities and replacing streets with roads, which thins out the presence of people and events and in turn – life (Gehl, 2010a, p. 46-47). Many of the characteristics of modernism that can impact people negatively such as the blankness of facades and dispersion of people are still present in buildings and urban areas that are built today. The problem remains and is perpetuated. Just look around you.

CONNECTING COGNITIVE ARCHITECTURE, PRACTICE AND EXISTING THEORIES

In order to better understand how people are impacted by the built environment, and how architects can design urban architecture that creates a higher potential for triggering positive emotional responses like those achieved in natural environments, architects can benefit from understanding different approaches to the topic. The topic of enhancing human wellbeing in the urban environment as a response to the negative effects of modernist architecture has been emphasized by, as already illustrated, different fields within architecture such as cognitive architecture, urbanists such as Jan Gehl, theorists such as Christopher Alexander and current architectural practices as for example Thomas Heatherwick from Heatherwick Studio. There are of course many more examples of different approaches to the topic. Research from environmental psychology illustrates that the visual environment impacts our cognition, response and action via our visual perception. So architects can affect that by designing and shaping the visual environment and stimuli (Gibson, 2015).

SPECIFIC SPATIAL CONDITIONS

Connecting theories and evidence from different approaches might provide new insights on how architects can positively impact human wellbeing in the urban environment. By comparing architectural theories relating specifically to the human cognitive experience of the urban environment, more accurate architectural principles for creating positive emotional responses in humans can be suggested. There is a gap in the research of specific spatial conditions and concrete design elements creating positive emotional responses in humans within the field of cognitive architecture (Azzazy et al., 2020, p. 329). Combining the findings in cognitive architecture with architectural theories might provide new knowledge and principles that can guide architects towards creating urban architecture that is more likely to trigger positive emotional responses and contribute to human wellbeing in the long term.

SYNTHESIZING ARCHITECTURAL PRINCIPLES TO TRIGGER POSITIVE EMOTIONAL RESPONSES

The thesis will attempt to synthesize the research with different approaches on topics relating to the aim of triggering positive emotional responses through urban architecture into architectural principles addressing specific spatial qualities and in that way contribute to helping architects design for human wellbeing. One has to recognize that individual memories and experiences affects how people feel about and respond to the environment around them which can make research difficult (Azzazy et al., 2020, p. 331). This also applies to cultural differences and preferences that change over time. The thesis will however focus on the universal perception-based preferences discussed in the selected literature that represent different approaches to the topic. And the principles that are suggested will enable opportunities for designing according to context and other individual considerations too.

A RESPONSIBILITY TO DESIGN FOR WELLBEING

I believe it is the responsibility of an architect working in the urban realm to understand how the built environment impacts humans. By gaining a deeper understanding of how the urban environment directly impacts the human brain and perception and designing for it, architects can contribute positively to the wellbeing of the growing urban population through designing with the intention of triggering positive emotional responses. Therefore, this thesis will investigate and propose architectural principles that can provide spatial conditions that trigger positive emotional responses in people.

PURPOSE

The main purpose of the thesis is to create an understanding of how architects can improve the wellbeing of the growing urban population by designing urban environments with the human cognition such as the visual sensory system in mind in order to create positive emotional responses in the population in the long term.

CONTRIBUTION

The main aim is to provide architectural principles that support human wellbeing by understanding how people respond to the built environment based on their perception and cognition and how to trigger positive emotional responses through architecture.

Through the synthesis of existing theories of human centered design and wellbeing in urban architecture and theories in the field of cognitive architecture, architectural principles will be created to contribute to the purpose outlined above.

DELIMITATIONS

Human centered design is the overall methodology, but the focus of the thesis is cognitive architecture and the impact of emotional responses triggered by the built environment and their long term effects.

Several architectural theories will be discussed and although other architectural theorists have made similar points, the literature has been limited due to the time span of the project.

When discussing how buildings make us feel, it does not entail sensory experiences such as thermal qualities, smell etc., but focus on the emotional response triggered by visual stimulation and the following brain processes.

Human wellbeing, in this context, includes mental and physical health in the sense of the effects of long term emotional responses triggered by the urban environment.

The focus of the thesis is on the built environment in an urban setting, not the natural environment, biophilia or the interior of buildings.

The thesis is not about aesthetics or beauty in architecture, but objective emotional responses relating to human biology.

The thesis recognises that there are cultural differences and that preferences change over time, but will focus on the universal perception-based preferences discussed in the selected literature.

HOW CAN ARCHITECTS CONTRIBUTE TO IMPROVING THE WELLBEING OF THE GROWING URBAN POPULATION?

THE THESIS WILL PRESENT ARCHITECTURAL PRINCIPLES FOR TRIGGERING POSITIVE EMOTIONAL RESPONSES

WHAT IS THE PURPOSE OF ARCHITECTS IF NOT TO DESIGN SPACES THAT MAKE PEOPLE FEEL GOOD?

PERSONAL MOTIVATION

My personal motivation for this thesis is the wish to better understand how the built environment impacts people. I have wondered from the beginning of my educational journey what makes architecture *good*. How do you create architecture that is beautiful, aesthetic, inspiring, lively, great or in other words, *good*? Is there a checklist you can follow, or does it have more to do with developing experience and intuition? I am sure that others that have taken this path will have wondered the same. Through my years of study and, more recently, upon finding a topic for my master thesis I encountered ideas that related the idea of good architecture to how it makes us feel. I resonated strongly with this, as architecture is mainly built for the purpose of providing spaces of different functions for people.

Therefore, I wanted to understand how architecture affects people, and more specifically how we can design spaces that make people feel good. Because what is the purpose of architecture and architects if not to make spaces and buildings that make people feel good?

SUSTAINABILITY PERSPECTIVE

The sustainability perspective of the thesis has two main focus areas: Densification and urban growth in relation to societal health and increasing the lifespan of buildings.

Firstly, with densification of cities and the increasing urban population, facilitation of healthy living conditions and social sustainability must be ensured. By focusing on human-centered design and the impact of the built environment on humans, architects and urban planners can influence this development in a positive manner. The thesis will aim to provide architectural strategies for this.

ENHANCE URBAN HEALTH

INCREASE THE LIFESPAN OF BUILDINGS

Secondly, the lifespan of buildings need to increase as the building process is the most energy intensive and polluting part of the life of the building. If architects design buildings that people care about and that makes people feel good, buildings are less likely to be torn down and rebuilt. If people have a good relationship or reaction to a building, it will increase the willingness to reuse and adapt the building for different purposes. By designing with an understanding of how the built environment affects humans, architects can help increase the lifespan of buildings by designing buildings that people respond positively to.

HOW CAN ARCHITECTS PROMOTE HUMAN WELLBEING IN A DENSIFYING AND GROWING URBAN ENVIRONMENT BY DESIGNING URBAN ARCHITECTURE THAT TRIGGERS POSITIVE EMOTIONAL RESPONSES IN HUMANS?

WHAT IS THE SIGNIFICANCE OF THE BUILT ENVIRONMENT'S IMPACT ON HUMAN COGNITION/EMOTIONAL RESPONSES?

HOW DO EXISTING HUMAN CENTERED DESIGN THEORIES WITHIN THE FIELD OF ARCHITECTURE COMPARE TO RESEARCH IN THE FIELD OF NEUROARCHITECTURE OR COGNITIVE ARCHITECTURE?

DOES THIS TRIGGER POSITIVE EMOTIONAL RESPONSES IN YOU?

Photograph by Jordan, retrieved from https://humanise.org/boring-building-index.

THESIS OUTLINE

CHAPTER 1: INTRODUCTION

The introduction presents the main objective of the thesis. The background and problem description that shaped the thesis question is introduced, as well as its aim, purpose and delimitations. The research question is presented, the main bibliography will be explained and justified and the methodology will be introduced.

CHAPTER 2: THEORETICAL APPROACHES

In the second chapter, the conducted research of theories and ideas related to the impact of the built environment on humans are presented.

CHAPTER 3: SYNTHESIZING PRINCIPLES

In the third chapter, the theoretical approaches are synthesized into principles that overlap across the theories.

CHAPTER 4: ARCHITECTURAL PRINCIPLES

In the fourth chapter, the theory is translated into architectural principles that are explained and illustrated. The strategies are an interpretation of the research made in order to identify specific spatial qualities that needs to be present in order to trigger positive emotional responses in the built urban environment.

CHAPTER 5: CASE STUDY ANALYSIS

Chapter five contains an analysis of three buildings, their streets and neighbourhoods in Gothenburg. The contexts are analysed according to the architectural principles to test how relevant the principles are to describe the built environment and a reflection of the results is presented.

CHAPTER 6: DESIGN IMPLEMENTATION

 In chapter six, the architectural principles are implemented in a design exercise that bases itself on the case study analysis. Part of the contexts that were analysed will be redesigned on different scales according to the principles, to test how relevant they are in a design process.

CHAPTER 7: DISCUSSION & REFLECTION

Lastly, the thesis work will be discussed and evaluated. The impact and value of the architectural principles created are assessed and further work is reflected upon.

DEFINITIONS

WELLBEING

In the context of this thesis, wellbeing refers to the long term effect of emotional responses triggered by the built urban environment.

EMOTIONAL RESPONSES

Emotional responses relates to how people experience the environment. An emotional response is triggered by the brain when we experience something, and this response can be either positive or negative.

HUMAN-CENTERED DESIGN

Human-centered design is the overall methodology in the thesis, but the focus is the impact of emotional responses triggered by the built environment and their long term effects.

COGNITIVE ARCHITECTURE

"We use Cognitive Architecture to explore how research in psychology and the cognitive sciences can inform our understanding of the impact of buildings and city design on people" (Sussman, 2021, p. 7)

FUNCTION OF EMOTION

The ability of buildings to mean something to us (TED, 2022).

HUMANISE

Humanise is a book written by Thomas Heatherwick (2023) which expresses how buildings should be more human.

PATTERN LANGUAGES

Pattern languages describe how to create life in architecture in different contexts by illustrating various spatial relationships. Each pattern consists of a context, a problem and a solution to that problem (Alexander, 1977).

EDGES

"Good connections between indoors and outdoors" with specific attention to creating spaces with favourable conditions for staying (Gehl, 2010, p. 197).

METHODOLOGY

The thesis went through three main stages: desk research, spatial analysis and research by design.

RESEARCH
The thesis is rooted in qualitative desk research. Different theoretical approaches are recorded with relevance to the topic of how people are impacted by the built environment in terms of the impact of long term emotional responses. Relevant sources were identified, catalogued and the main points were synthesized. In the synthesis, the theoretical approaches were compared to find overlapping principles and theories. This research provides a foundation for the architectural principles that are developed in the next stage.

RESEARCH: THEORETICAL APPROACES AND SYNTHESIS

INTERPRETATION
Further, these theories were interpreted and translated into architectural principles that propose spatial conditions of the built urban environment that trigger positive emotional responses in humans, and thereby contribute to wellbeing. The principles were developed by destilling the synthesized research to define the specific spatial conditions. The principles then went through several stages of iteration of writing and illustration before reaching their final form.

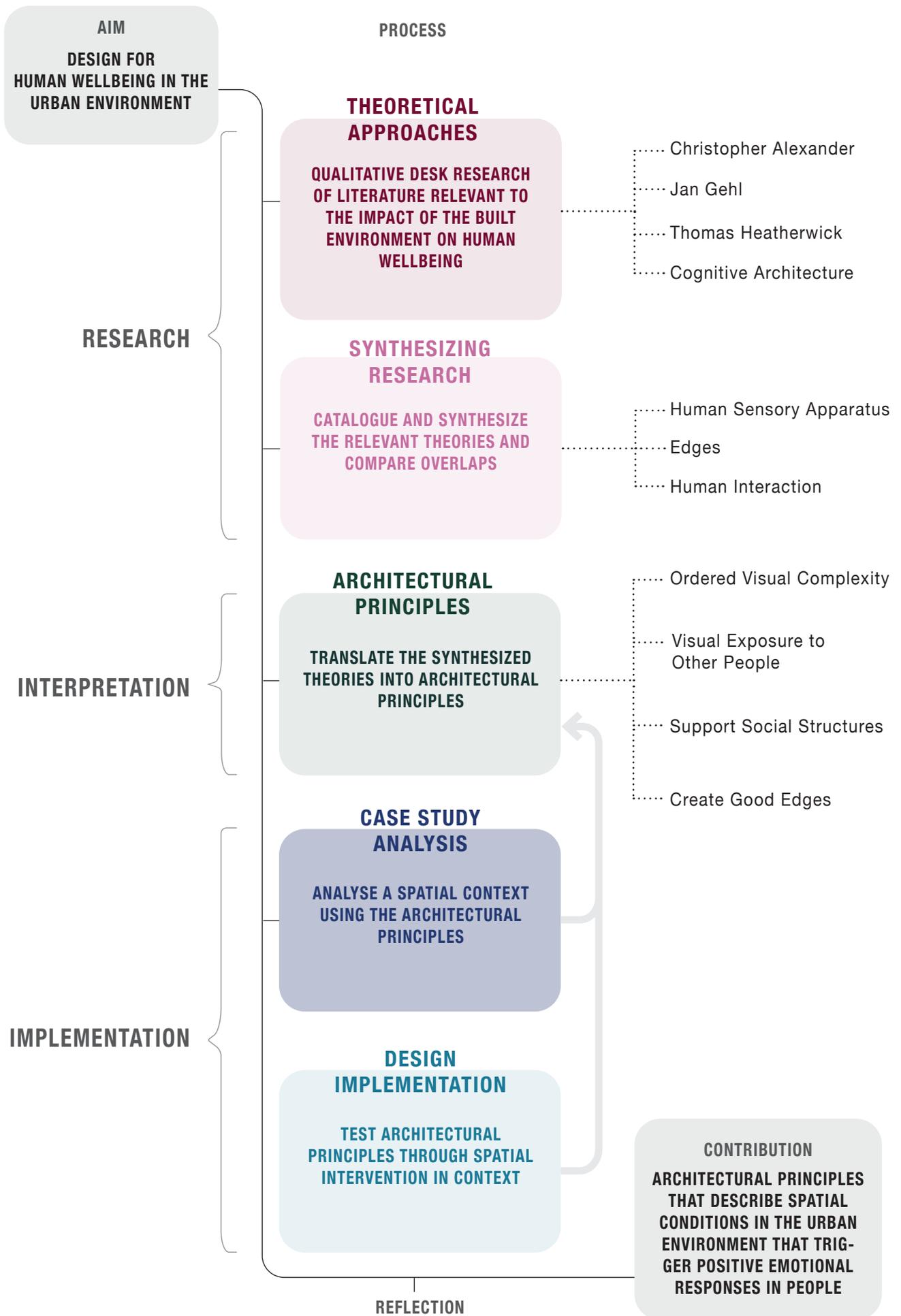**INTERPRETATION: ARCHITECTURAL PRINCIPLES**

IMPLEMENTATION
Spatial analysis of the specific context and the different typologies present was done according to the architectural principles identified. The analysis describes how three contexts relate to and fulfil the different principles. The results of the analysis provides the basis for a reflection on the case studies and how the principles should impact the design process.

IMPLEMENTATION: CASE STUDY ANALYSIS & DESIGN IMPLEMENTATION

In the case study, street types and density is included to comment on how they impact the context in relation to the presence of people and building exposure.

To test the principles in a design process, one of the analysed buildings was used for a design exercise. In the design process, changes to the existing context were made according to the results of the case study analysis and the architectural principles were used to create these changes. The design process focused on the concept stage of design and as a result of the case study analysis it focuses on sketching within context and creating many iterations on different scales. The outcome of the design exercise is an illustration of the process using the architectural principles as guidance.

AIM

**DESIGN FOR
HUMAN WELLBEING IN THE
URBAN ENVIRONMENT**

PROCESS

RESEARCH

**THEORETICAL
APPROACHES**

**QUALITATIVE DESK RESEARCH
OF LITERATURE RELEVANT TO
THE IMPACT OF THE BUILT
ENVIRONMENT ON HUMAN
WELLBEING**

········ Christopher Alexander

········ Jan Gehl

········ Thomas Heatherwick

········ Cognitive Architecture

**SYNTHESIZING
RESEARCH**

**CATALOGUE AND SYNTHESIZE
THE RELEVANT THEORIES AND
COMPARE OVERLAPS**

········ Human Sensory Apparatus

········ Edges

········ Human Interaction

INTERPRETATION

**ARCHITECTURAL
PRINCIPLES**

**TRANSLATE THE SYNTHESIZED
THEORIES INTO ARCHITECTURAL
PRINCIPLES**

········ Ordered Visual Complexity

········ Visual Exposure to
Other People

········ Support Social Structures

········ Create Good Edges

IMPLEMENTATION

**CASE STUDY
ANALYSIS**

**ANALYSE A SPATIAL CONTEXT
USING THE ARCHITECTURAL
PRINCIPLES**

**DESIGN
IMPLEMENTATION**

**TEST ARCHITECTURAL
PRINCIPLES THROUGH SPATIAL
INTERVENTION IN CONTEXT**

CONTRIBUTION

**ARCHITECTURAL PRINCIPLES
THAT DESCRIBE SPATIAL
CONDITIONS IN THE URBAN
ENVIRONMENT THAT TRIG-
GER POSITIVE EMOTIONAL
RESPONSES IN PEOPLE**

REFLECTION

THEORETICAL APPROACHES

The thesis covers the topic of the built urban environments impact on human emotional responses with four main approaches. The four approaches explain different parts of the topic, as well as illustrate consensus and overlaps. The theory of affordances is also included to provide an overall philosophy for the principles.

JAN GEHL

Jan Gehl's ideas present the new urbanism theories of human-centered urban design, soft edges and the social field of vision. He approaches the field of urban design focusing on the conditions that need to be present in order for people to want to spend longer time in the urban environment and sees the presence of other people as a great contributor to favourable environments.

CHRISTOPHER ALEXANDER

Christoper Alexander's theory of pattern languages provides the knowledge of an existing framework of design principles rooted in the idea of creating life through architecture. The quality without a name which relates to the idea of life will be explored as it provides an approach of how to achieve nature-like features in architecture that trigger positive emotional responses and describes 15 properties that are present in things that have life.

THOMAS HEATHERWICK

The architect Thomas Heatherwick presents current views on the function of emotion in architecture from a contemporary perspective and adresses the need to humanise architecture.

COGNITIVE ARCHITECTURE

The field of cognitive architecture will be explored to create an understanding of the urban environment's impact on the universal human brain in terms of which spatial conditions trigger positive emotional responses.

AFFORDANCE

The theory of affordances provide an overall philosophy of intentional design principles based on human perception and experience. In this context, the intended affordance is triggering positive emotional responses.

SYNTHESIS & ARCHITECTURAL PRINCIPLES

These approaches will be catalogued, synthesized and translated into principles describing how architects can design urban environments that trigger positive emotional responses in people.

DIFFERENT APPROACHES TO THE TOPIC WILL BE PRESENTED

HOW TO FACILITATE COPRESENCE & GOOD STAYING CONDITIONS

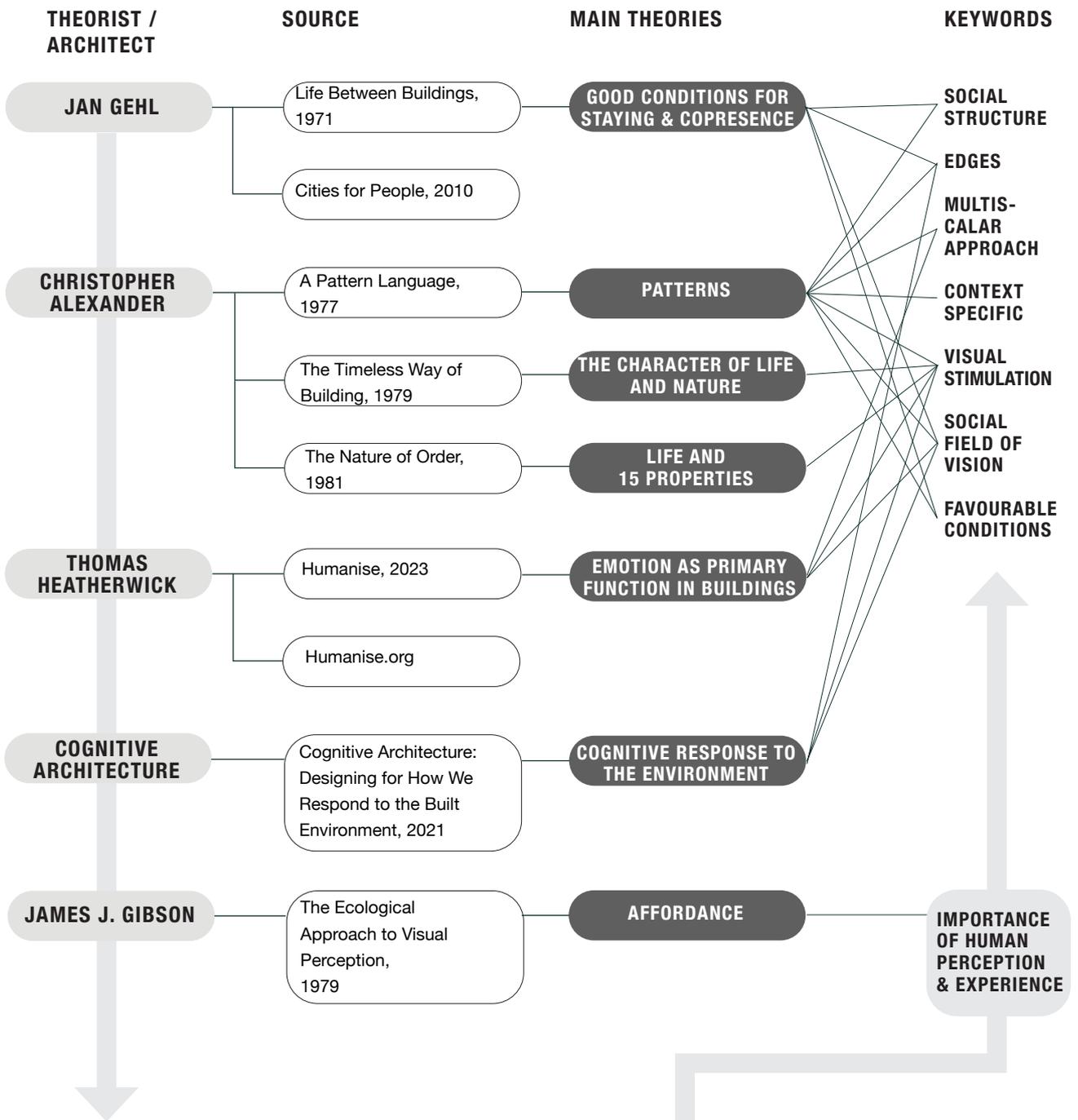PATTERN LANGUAGES, CREATING LIFE IN ARCHITECTURE & 15 PROPERTIES

THE FUNCTION OF EMOTION

WHAT TRIGGERS POSITIVE EMOTIONAL RESPONSES?

AFFORDANCE RELATES TO THE HUMAN EXPERIENCE

THEORY IS TRANSLATED INTO PRINCIPLES

THEORIST / ARCHITECT	SOURCE	MAIN THEORIES	KEYWORDS

JAN GEHL
- Life Between Buildings, 1971
- Cities for People, 2010

GOOD CONDITIONS FOR STAYING & COPRESENCE

CHRISTOPHER ALEXANDER
- A Pattern Language, 1977
- The Timeless Way of Building, 1979
- The Nature of Order, 1981

PATTERNS

THE CHARACTER OF LIFE AND NATURE

LIFE AND 15 PROPERTIES

THOMAS HEATHERWICK
- Humanise, 2023
- Humanise.org

EMOTION AS PRIMARY FUNCTION IN BUILDINGS

COGNITIVE ARCHITECTURE
- Cognitive Architecture: Designing for How We Respond to the Built Environment, 2021

COGNITIVE RESPONSE TO THE ENVIRONMENT

JAMES J. GIBSON
- The Ecological Approach to Visual Perception, 1979

AFFORDANCE

KEYWORDS:
- SOCIAL STRUCTURE
- EDGES
- MULTISCALAR APPROACH
- CONTEXT SPECIFIC
- VISUAL STIMULATION
- SOCIAL FIELD OF VISION
- FAVOURABLE CONDITIONS

IMPORTANCE OF HUMAN PERCEPTION & EXPERIENCE

THEORETICAL APPROACHES

CATALOGUE THEORY

SYNTHESIZE PRINCIPLES

COMPARE APPROACHES

ARCHITECTURAL PRINCIPLES

OVERLAPPING PRINCIPLES

INTERPRETATION

CHAPTER 2: THEORETICAL APPROACHES

This chapter will go through the research catalogued relating to how the built environment creates emotional responses in humans and different architectural approaches to creating wellbeing in an urban environment. The theoretical approaches presented will provide different perspectives and a better understanding of the topic and its relevance. The main aim of the desk research is to create a basis for the architectural principles for human wellbeing in an urban environment.

JAN GEHL: THE IMPORTANCE OF HUMANS IN THE BUILT ENVIRONMENT

In the book "Life Between Buildings" (1971), Jan Gehl wrote about the importance of humans in public spaces and what conditions contribute to humans wanting to spend time in the urban environment. He believes humans and life are the most important attractors in the urban environment, even more important than the spatial qualities: "Life in buildings and between buildings seems in nearly all situations to rank as more essential and more relevant than the spaces and buildings themselves" (Gehl, 2010, p. 29). But in order for people to spend time in the urban environment, the environment itself has to offer good conditions for people to stay, sit, walk and socialize. If not, Gehl explains that "only strictly necessary activities will occur" (Gehl, 2010, p. 11).

HUMANS ARE ATTRACTORS IN THE URBAN ENVIRONMENT

URBAN PLANNING AFFECTS HUMAN ACTIVITY

Two extremes of urban planning are presented in his theories, as well as their effects on human activity: the modern high-rise spread-out city and a town with low closely spaced buildings. The first extreme is seen as preferring the car and few people are seen within the cityscape as the "large and impersonal" outdoor areas do not invite human activity (Gehl, 2010, p. 31). The other extreme is seen as preferred because it favours travel by foot and provides "good areas for outdoor stays" around the buildings (Gehl, 2010, p. 31). This comparison shows a clear preference for the low rise and dense urban environment which is also seen in the other theoretical directions. Gehl explains the development towards the high-rise city as an effect of the 1930's functionalist obsession with the physiological effects of the built environment, where the importance of solar orientation and light led to tall buildings surrounded by roads and large green spaces, but also ended up dispersing people and events (Gehl, 2010, p. 43-45). This planning shift came as a response to overpopulated urban areas with poor living conditions and although providing physically healthier living environments at the time, one now discovers the negative effects of this typology (Gehl, 2010, p. 45). Maybe a new shift is needed?

TWO EXTREMES: MODERN HIGH RISES AND LOW DENSE BUILDINGS
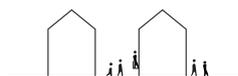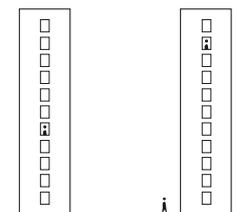
GUIDELINES FOR THE URBAN ENVIRONMENT

Jan Gehl presents his own guidelines for favourable conditions in the urban environment that can impede or facilitate contact between people (Gehl, 2010, p. 53). These guidelines are based on long term qualitative observations of how public spaces are used by people. The better the physical conditional are, the more people stay outdoors and for a longer time (Gehl, 2010, p. 33). Gehl also claims that life between buildings can reinforce itself and grow in size and duration if the conditions are right, but if there is no life, then nothing else happens either (Gehl, 2010, p. 73).

THE IMPORTANCE OF SOCIAL STRUCTURE

The guidelines he presents have the underlying idea "that the physical structure – the project – both visually and functionally supports the desired social structure of the residential area" (Gehl, 2020, p. 57). The built environment conditions must facilitate and enhance the social structure of the area in order to create favourable conditions for life between buildings. Social structures relate to networks of social interaction and could for example be a neighbourhood community consisting of numerous households, a workplace or school. An example of supporting the social structure is subdividing residential areas into groups to create a sense of security and belonging or creating a hierarchy of privacy within communal spaces to create gentle transitions between public and private (Gehl, 2010, p. 58-61).

THE SOCIAL FIELD OF VISION

The specific characteristics of the human sensory system are important for spatial perception and the conditions necessary to create a favourable environment for spending time in (Gehl, 2010, p. 63). This is shaped by the social field of vision. Gehl explains the social field of vision to be 0 - 100 m with different distances for catching different amounts of detailed information about a person such as being able to perceive the mood and feelings of a person from 20-25 m away (Gehl, 2010, p. 65). Social distances for different types of interaction are presented, but the distance of 3.25 m is specifically highlighted as useful in the context of starting conversations comfortably between people (Gehl, 2010, p. 67-69). A parallel is also drawn between social situation and space, where smaller dimensions indicate something warm or intimate, a larger space could feel cold and impersonal (Gehl, 2010, p. 69).

Gehl presents 5 main ways of inhibiting or promoting contact, rooted in the human sensory system. The below diagram is a drawn interpretation of Gehl's diagram (Gehl, 2010a).

| WALLS | LONG DISTANCES | HIGH SPEEDS | MULTIPLE LEVELS | BACK-TO-BACK ORIENTATION |

| NO WALLS | SHORT DISTANCES | LOW SPEEDS | ONE LEVEL | FACE-TO-FACE ORIENTATION |
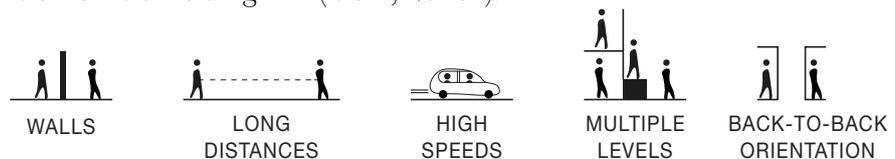
SCALES

The thought of facilitating social life between buildings on different scales is important, but the small scale in which the individual meets its surroundings is the most significant (Gehl, 2010, p. 83). "The immediate environment – is where the individual person meets and evaluates decisions made at all planning levels. The battle for high quality in cities and building projects must be won at the very small scale, but preparations for successful work at this level must be made on all planning levels" (Gehl, 2010, p. 83).

For successful large-scale planning, the city must not be dispersed and dependent on car travel, but assembled with all functions alongside and facing the street (Gehl, 2010, p. 85).

On the medium scale, large distances between buildings must be avoided and a network of public spaces with short distances connected through pedestrian traffic must be facilitated (Gehl, 2010, p. 85).

At the small scale, the life between buildings is created. It is important to consider that the outdoor spaces and facades have human dimensions and fits the amount of people the space will be used by (Gehl, 2010, p. 91). Specific features that Gehl draws forward as favourable in a street are: narrow units within the façade with many doors leading onto the street, assembling walkways on one level and creating smaller spaces within a larger space in which one can stay for a longer time (Gehl, 2010, p. 91, 97). Another important feature considers the threshold of levels - the taller the building are, the less meaningful contact it can have with the street. Gehl therefore prefers low buildings (Gehl, 2010, p. 98-99).

SOFT EDGES

Jan Gehl presents the idea of soft edges, which entails "good connections between indoors and outdoors" with specific attention to creating spaces with favourable conditions for staying (Gehl, 2010, p. 197). Staying activities stands for 90% of the time we spend outside, while come-and-go activities stand for 10%, which is why creating conditions for lasting activities are the most important (Gehl, 2010, p. 183). People prefer to stay or sit along edges because they provide protection and give you an overview of the space (Gehl, 2010, p. 149, 157).

Creating these spaces for staying in the areas right outside dwellings is important believes Gehl, and he provides three important features for these spaces to be successful: "good access in and out", "good staying areas directly in front of the houses" and "something to do" (Gehl, 2010, p. 197, 184). It should be "easy for events to flow in and out", both physically and psychologically (Gehl, 2010, p. 187)."

GOOD URBAN CONDITIONS MUST BE FACILITATED AT ALL SCALES, BUT THE IMMEDIATE SCALE IS MOST IMPORTANT
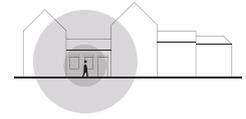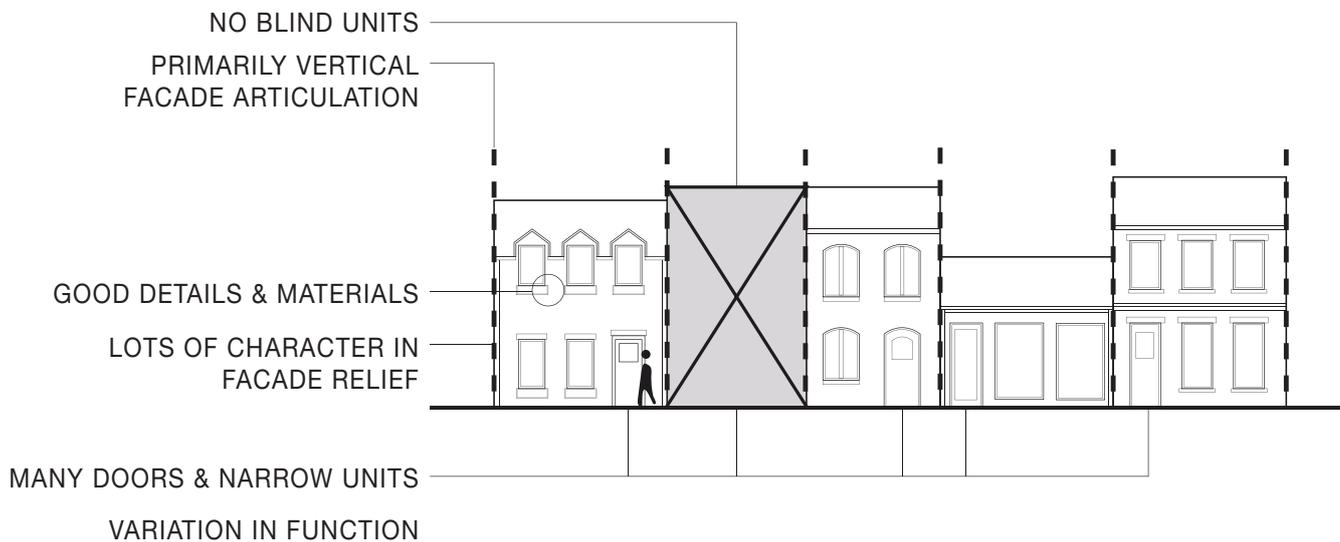
EDGES PROVIDE PROTECTION AND OVERVIEW, THEREFORE PEOPLE LIKE THEM

ACTIVE GROUND FLOORS
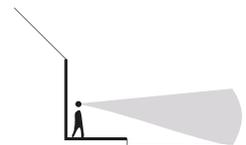
ACTIVE GROUND FLOORS CAN CREATE SOFT EDGES

Ground floors are "the exchange zone between building and city, here is where pedestrians pass close by and have time to enjoy experiences large and small on their way" and can help create soft edges between the private interior of buildings and the public outdoors (Gehl, 2010b, p. 240). The ground floor also relates to the smaller scale immediate environment, which mentioned, Gehl emphasize as important. Passive ground floors are characterized by "large units, many closed facades, blind windows and lack of detail" and removes pedestrians and life from the city (Gehl, 2010b, p. 240). Gehl proposes a measuring scale and set of characteristics to achieve active ground floors which stems from an urban renewal project in Stockholm, Sweden in the 1990s, which can be used to improve the conditions of important streets (Gehl, 2010b, p. 240).

NO BLIND UNITS

PRIMARILY VERTICAL
FACADE ARTICULATION

GOOD DETAILS & MATERIALS

LOTS OF CHARACTER IN
FACADE RELIEF

MANY DOORS & NARROW UNITS

VARIATION IN FUNCTION

THE HUMAN DIMENSION

ALL HUMANS HAVE THE SAME SENSORY SYSTEM AND EXPERIENCE

"It all comes down to people, who have the same basic point of departure. All people have walking, a sensory apparatus, movement options and basic behaviour patterns in common" (Gehl, 2010b, p. 229).

Humans are similar in that aspect. As Gehl explains above in "Cities for People" (2010), the human dimension is important because it applies to all humans, and therefore must be taken into consideration when designing human cities. He believes this has been ignored within urban development in the last 50 years (Gehl, 2010b, p.229).

PRINCIPLES OF THE HUMAN DIMENSION

The following principles are presented in order to ensure the integration of the human dimension in city planning (Gehl, 2010b, p. 229):

1.   Carefully locate the city's functions to ensure shorter distances between them and a critical mass of people and events

2.   Integrate various functions in cities to ensure versatility wealth of experience, social sustainability and a feeling of security in individual city districts.

3.   Design city space so it is inviting and safe for pedestrian and bicycling traffic.

4.   Open up the edges between the city and buildings so that life inside buildings and outside in city spaces can work together.

5.   Work to strengthen the invitations to invite longer stays in city space because a few people spending much time in a place provide the same sense of lively space as many people spending only a short time. Of all the principles and methods available for reinforcing life in cities, inviting people to spend more time is the simplest and most effective.
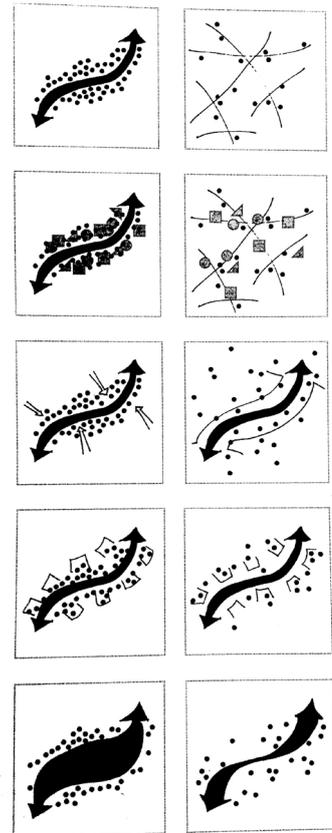
Figure from Gehl, 2010b, p. 229

QUALITY CRITERIA

In order to achieve the last principle "to invite longer stays in city space", certain criteria are set to ensure good quality spaces, and these are rooted in creating positive sensory experiences (Gehl, 2010b, p. 238). The first criteria topic is protection, which is essential to be in place for anyone to feel safe in a space (Gehl, 2010b, p. 238). The second topic is good comfort for different activities that invites people to spend time there (Gehl, 2010b, p. 238). The last topic, delight, entails the integration of human scale, the ability to enjoy the weather and positive sensory experiences (Gehl, 2010b, p. 238).

Gehl proposes that the criteria "Positive sensory experiences" should be an "umbrella concept that should include all of the other areas", and therefore indicating that the ability to create positive sensory experiences is the overall inclusion of all the other strategies mentioned. (Gehl, 2010b, p. 238). In order to create positive emotional responses in humans, these needs must be covered.

GOOD QUALITY SPACES CREATE POSITIVE SENSORY EXPERIENCES

Protection	PROTECTION AGAINST TRAFFIC AND ACCIDENTS — FEELING SAFE · Protection for pedestrians · Eliminating fear of traffic	PROTECTION AGAINST CRIME AND VIOLENCE — FEELING SECURE · Lively public realm · Eyes on the street · Overlapping functions day and night · Good lighting	PROTECTION AGAINST UNPLEASANT SENSORY EXPERIENCES · Wind · Rain/snow · Cold/heat · Pollution · Dust, noise, glare
Comfort	OPPORTUNITIES TO WALK · Room for walking · No obstacles · Good surfaces · Accessibility for everyone · Interesting façades	OPPORTUNITIES TO STAND/STAY · Edge effect/ attractive zones for standing/staying · Supports for standing	OPPORTUNITIES TO SIT · Zones for sitting · Utilizing advantages: view, sun, people · Good places to sit · Benches for resting
	OPPORTUNITIES TO SEE · Reasonable viewing distances · Unhindered sightlines · Interesting views · Lighting (when dark)	OPPORTUNITIES TO TALK AND LISTEN · Low noise levels · Street furniture that provides "talkscapes"	OPPORTUNITES FOR PLAY AND EXERCISE · Invitations for creativity, physical activity, exercise and play · By day and night · In summer and winter
Delight	SCALE · Buildings and spaces designed to human scale	OPPORTUNITIES TO ENJOY THE POSITIVE ASPECTS OF CLIMATE · Sun/shade · Heat/coolness · Breeze	POSITIVE SENSORY EXPERIENCES · Good design and detailing · Good materials · Fine views · Trees, plants, water
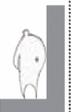
Figure from Gehl, 2010b, p. 239

POSITIVE SENSORY EXPERIENCES CAN BE CREATED THROUGH ACHIEVING ALL THE QUALITY CRITERIA ON THE SMALL SCALE, AS WELL AS THE PRINCINPLES FACILITATING THE LARGER SCALES.

CHRISTOPHER ALEXANDER: LIFE & PATTERN LANGUAGES

THE TIMELESS WAY

The timeless way of building is a "physical embodiment" of the quality without a name that can give life to the built environment (Alexander, 1979, p. 528, 41). The quality without a name relates to being alive, whole, true and free (Alexander, 1979, p. 41, 105). Alexander presents "kernels" or core mindsets which leads to the timeless way of building.

LIFE: ALIVE, WHOLE, TRUE & FREE

1   Be receptive to what is real and appropriate (Alexander, 1979, p. 543)
2   Be Egoless - include only what is required for the situation (Alexander, 1979, p.535, 537)
3   Be Innocent and do not try to create an outer image (Alexander, 1979, p.535)
4   Let go of control, and be a medium for the forces of the situation (Alexander, 1979, p.539)
5   Be ordinary and natural (Alexander, 1979, p.540)

The last point urges the importance of instinct in relation to achieving the timeless way: "Your first, most primitive impulses are right, and will lead you to do the right thing" (Alexander, 1979, p. 547). The character described can appear in buildings when the inner forces of the building are resolved, which can be done through pattern languages (Alexander, 1979, p. 525).

THE FORCES OF THE SITUATION MUST BE RESOLVED TO CREATE LIFE

LIFE AND NATURE

Life, or the quality without a name, is the character of nature, according to Alexander (Alexander, 1979, p. 143). He translates the character of nature into spatial qualities that can be perceived clearly.

LIFE IS THE CHARACTER OF NATURE

"Nature is never modular. Nature is full of almost similar units (waves, raindrops, blades of grass) – but though the units of one kind are all alike in their broad structure, no two are ever alike in detail.
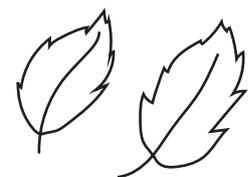
1   The same broad features keep recurring over and over again.
2   In their detailed appearance these broad features are never twice the same."
(Alexander, 1979, p. 144)

If this quality of nature, which is life, appears in the built environment, it can give it life (Alexander, 1979, p. 152). Alexander provides an answer as to how to achieve this quality through introducing pattern languages (Alexander, 1979, p. 155). And these patterns teaches you to "act as nature does" which Alexander explains to be "the most ordinary thing in the world" (Alexander, 1979, p. 548).

YOU CAN USE THE PATTERN LANGUAGES TO CREATE LIFE

"Almost everybody feels at peace with nature: listening to the ocean waves against the shore, by a still lake, in a field of grass, on a windblown heath. One day, when we have learned the timeless way again, we shall feel as much at peace in them, as we do today walking by the ocean, or stretched out in the long grass of a meadow."

(Alexander, 1979, p. 549)

THE CHARACTER OF LIFE IS ABOUT CREATING THE SAME POSITIVE EMOTIONAL RESPONSES THAT ARE TRIGGERED BY A NATURAL ENVIRONMENT, IN THE BUILT ENVIRONMENT AS WELL.

PATTERN LANGUAGES

"A pattern language gives each person who uses it, the power to create an infinite variety of new and unique buildings, just as his ordinary language gives him the power to create an infinite variety of sentences" (Alexander, 1979, p. 167)

The purpose of pattern languages is to create life in the built environment (Alexander, 1979, p. 155). Patterns are defined here: "Each pattern is a rule which describes what you have to do to generate the entity which it defines" (Alexander, 1979, p. 182). And pattern languages are made up of a system of patterns (Alexander, 1979, p. 183). This limited combinatory system can create infinite combinations, much like nature can create endless forests of trees with the same properties, but never looking quite the same (Alexander, 1979, p. 187). The patterns are the genetic codes of buildings, and every pattern has three spatial components: a context, a problem and a solution (Alexander, 1979, p. 192, 247). Patterns are about problem solving, and each pattern solves one specific issue in a defined context through a configuration of spatial relationships (Alexander, 1979, p. 253). Patterns can therefore be created to solve specific problems that arise in the urban environment. Alexander argues that everyone can make patterns through either problem definition or building on positive examples (Alexander, 1979, p. 258-259). In A Pattern Language (1977) Alexander decribes 253 patterns from the country scale, to the city scale, to the neighbourhood scale, to the building scale and detail scale.

PATTERN 160: BUILDING EDGE

To illustrate an example of a pattern and how it can be useful, here is an example of pattern 160 Building Edge which relates to Gehl's thoughts about edges. It becomes visible here that edges must be facilitated with a multiscalar approach.

CONTEXT: "The zone between the indoors and the outdoors (Alexander, 1977, p. 753)"

PROBLEM: "A building is most often thought of as something which turns inward - towards its rooms. People do not often think of a building as something which must also be oriented toward the outside (Alexander, 1977, p. 755)".

SOLUTION: "Make sure that you treat the edge of the building as a "thing," a "place", a zone with volume to it, not a line or interface which has no thickness. Crenelate the edge of buildings with places that invite people to stop. Make places that have depth and a covering, places to sit, lean, and walk, especially at those points along the perimeter which look onto interesting outdoor life (Alexander, 1977, p. 755)."

PATTERNS FACILITATE AN INFINITE VARIETY OF DESIGNS

PATTERNS

CONTEXT

PROBLEM

SOLUTION

DESIGN

SPATIAL CONDITIONS
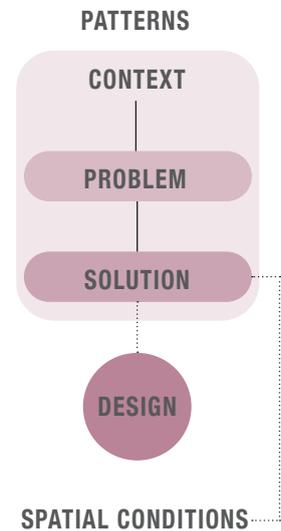
LIFE GROWS FROM BUILDING EDGES

ALEXANDER'S ILLUSTRATION OF THE PATTERN

crenelation

depth along the edge

shelter
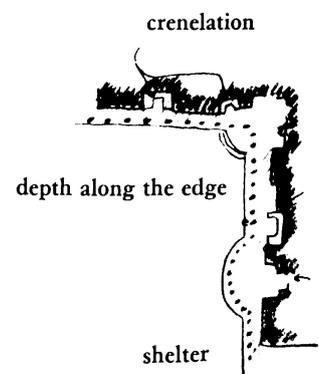
Illustration retrieved from Alexander, 1977, p. 755

PATTERNS AND LIFE

PATTERN LANGUAGES CREATE LIFE

To create life in the built environment, the pattern languages have to live (Alexander, 1979, p. 122). Patterns that live have intensity, are rooted in reality, meet human needs and stabilize the forces that are present in the context (Alexander, 1979, p.402, 518). Lively patterns create a whole (Alexander, 1979, p. 305). The language helps us "do what is natural" and therefore helps us create "places which are a part of nature" with endless repetition and variety (Alexander, 1979, p. 544, 384, 137).

HOW DOES THE PATTERN MAKE YOU FEEL?

To test whether the patterns are successful or not, Alexander suggests to ask yourself how the pattern makes you feel (Alexander, 1979, p. 290). When designing a space, ask yourself: What would it look like if it already existed and was the "most wonderful" place in the world (Alexander, 1979, p. 391-392)? Alexander thereby relates the ability of creating life in the built environment to how the space makes you feel. Pattern languages help create living spaces by allowing what he calls "this inner thing, which carries your feelings, to guide your acts" (Alexander, 1979, p. 545), implying the significance of what humans feel about the built environment. This also explains how using the pattern languages work in a way that feels natural and context sensitive, rather than influenced by trends, opinions and styles.

 "*The language frees you to be yourself, because it gives you permission to do what is natural, and shows you your innermost feelings about building while the world is trying to suppress them.*" (Alexander, 1979, p. 544)

CREATE PLACES WHICH ARE A PART OF NATURE

In that way, if a person uses the patterns, you can create "places which are a part of nature", as life in the built environment is about creating the positive emotional repsonses that are triggered by nature (Alexander, 1979, p. 384).

PATTERNS THAT ARE CONSIDERED IN THE PRINCIPLES

Below are the patterns that are relevant to the thesis as they relate to the urban environment and can contribute to triggering positive emotional responses.

NEIGHBOURHOOD SCALE	**BUILDING EDGE SCALE**
21 FOUR-STORY-LIMIT	110 MAIN ENTRANCE
95 BUILDING COMPLEX	112 ENTRANCE TRANSITION
120 PATHS AND GOALS	115 COURTYARDS WHICH LIVE
121 PATH SHAPE	124 ACTIVITY POCKETS
	140 PRIVATE TERRACE ON THE STREET
STREET SCALE	160 BUILDING EDGE
61 SMALL PUBLIC SQUARES	164 STREET WINDOWS
100 PEDESTRIAN STREET	165 OPENING TO THE STREET
108 CONNECTED BUILDINGS	166 GALLERY SURROUND
114 HIERARCHY OF OPEN SPACE	205 STRUCTURE FOLLOWS SOCIAL SPACES
116 CASCADE OF ROOFS	241 SEAT SPOTS
119 ARCADES	242 FRONT DOOR BENCH
122 BUILDINGS FRONTS	249 ORNAMENT

15 PROPERTIES OF LIFE

In "The Nature of Order" (2002), Alexander further wrote about the idea of life in architecture, and created a list of properties that were characteristics of the objects and spaces with most life (Galle, 2020, p. 367). Life is easily found in nature, but creating it in the built environment is difficult (Alexander, 2002). For something to have life, it needs to be whole and coherent (Alexander, 2002, p. 137). Following are 15 properties that Alexander qualitatively observed in objects and buildings that have life and feel whole visually.

These properties are a strategy towards creating visual stimulation rooted in the character of nature, and can therefore help architects create spaces that feel whole and trigger positive emotional responses in people.

THE 15 PROPERTIES DESCRIBE SPACES THAT HAVE LIFE

THE PROPERTIES ARE ROOTED IN THE CHARACTER OF NATURE

THE 15 PROPERTIES REDRAWN ACCORDING TO DESCRIPTION

Figure drawn from Alexander, 2002.

LEVELS OF SCALE

STRONG CENTRES

BOUNDARIES

ALTERNATING REPETITION

POSITIVE SPACE

GOOD SHAPE

LOCAL SYMMETRIES

DEEP INTERLOCK AND AMBIGUITY

CONTRAST

GRADIENTS

ROUGHNESS

ECHOES

THE VOID

SIMPLICITY AND INNER CALM

NOT-SEPARATEDNESS
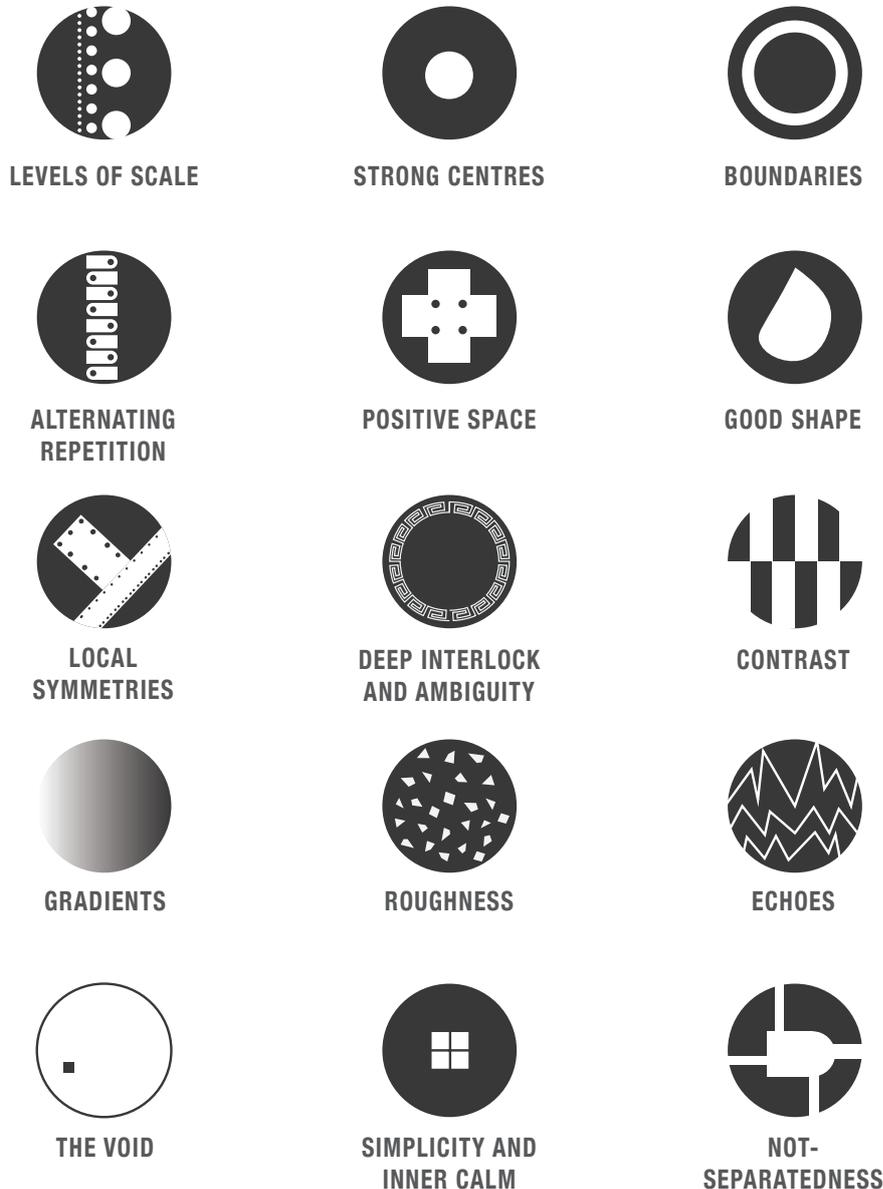
EXAMPLES OF
SPACES ALEXANDER
PERCEIVES TO HAVE
LIFE AND THEIR
ASSOCIATED
PROPERTIES OF LIFE

LIFE IN A DANISH COURTYARD

PROPERTIES:

LEVELS OF SCALE

BOUNDARIES

ALTERNATING
REPETITION

LOCAL
SYMMETRIES

CONTRAST

ROUGHNESS
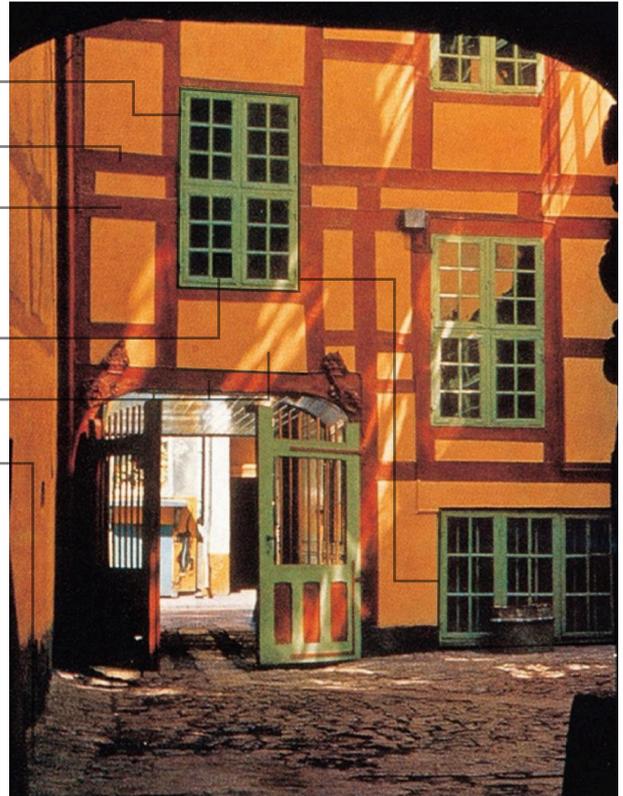
Retrieved from Alexander, 2002, p. 41

LIFE IN THE MASDI-I-SHAH

PROPERTIES:

LEVELS OF SCALE

STRONG CENTERS

BOUNDARIES

ALTERNATING
REPETITION

GOOD SHAPE

LOCAL
SYMMETRIES

DEEP INTERLOCK
AND AMBIGUITY

ECHOES
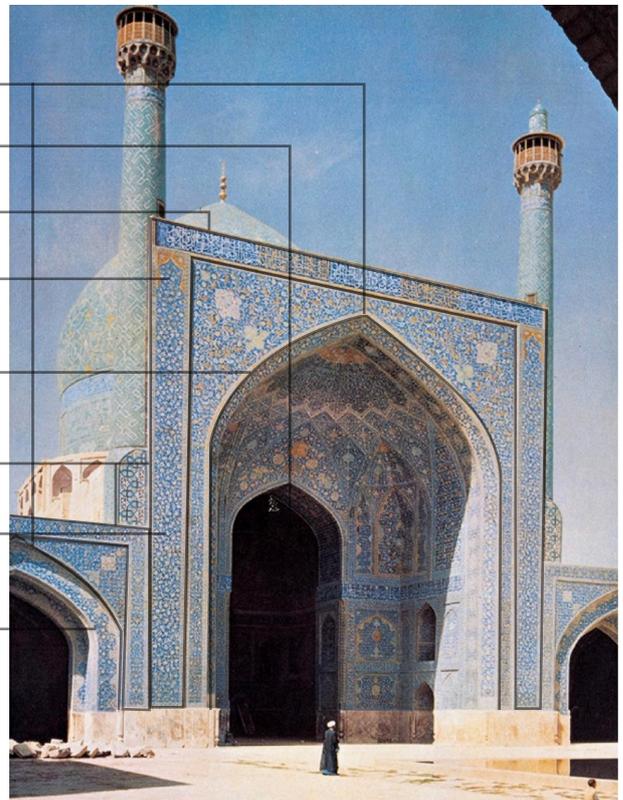
Retrieved from Alexander, 2002, p. 42

THOMAS HEATHERWICK: THE FUNCTION OF EMOTION

BORING EQUALS UNHUMAN

Heatherwick claims that buildings in the last 100 years have become "boring", a characteristic which he identifies as too flat, plain, shiny, monotonous, anonymous and serious (Heatherwick, 2023, p. 86, 91). He further refers to sources from research which show that boring places are inhuman and lead to stress, sickness, loneliness, division and conflict (Heatherwick, 2023, p. 141). He believes that one should make people who experience the building from the outside feel good, because in most occasions, more people pass by a building than are in it (Heatherwick, 2023, p. 84).
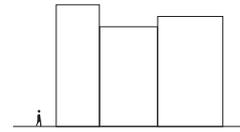
BORING BUILDINGS ARE HARMFUL

HUMANISE BUILDINGS

The solution he proposes is to humanize buildings through a shift in design thinking towards creating human places and suggests that if emotion is the primary function of buildings it would lead to more human places (Heatherwick, 2023, p. 333). The function of emotion ties in with the emotional response created in humans when experiencing the built environment. To create a human place which responds to the function of emotion concept, Heatherwick proposes the Humanise rule which relates to visual stimulation on multiple scales (Heatherwick, 2023, p. 351):

THE FUNCTION OF EMOTION CREATES HUMAN PLACES

A building should be able to hold your attention for the time it takes to pass by it. In order to pass the test this rule sets, a building must be interesting from three distances:
1.   City distance of over 40 m
2.   Street distance of around 20 m
3.   Door distance of about 2 m

THE HUMANISE RULE

DOOR
2 M

STREET
20 M

CITY
40 M
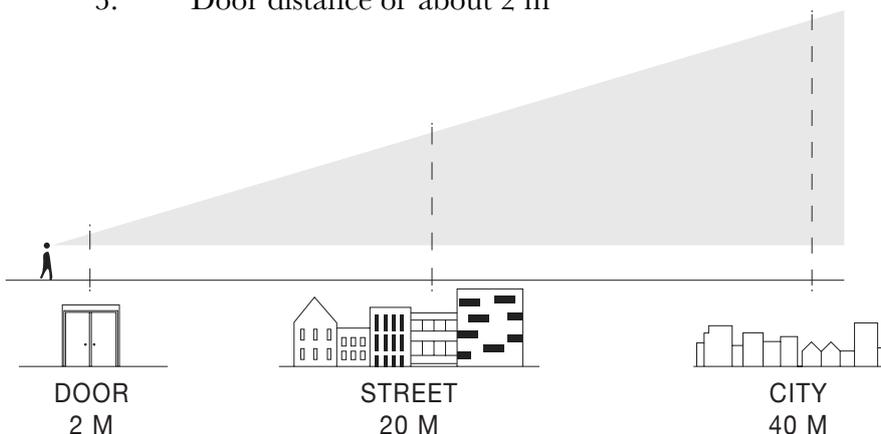
WHAT IS THE FUNCTION OF EMOTION IN ARCHITECTURE?

According to Thomas Heatherwick, the function of emotion in architecture is the ability of buildings to mean something to us (TED, 2022). That translates into which emotions buildings trigger in us, either positive or negative.

THE FUNCTION OF EMOTION IS HOW BUILDINGS AFFECT OUR EMOTIONS

SHIFTS IN THINKING

Further, he presents three ways in which to shift the thinking of architects in order to create more interesting buildings that are more likely to adhere to the rule (Heatherwick, 2023, p. 372).

ACCEPT THAT HOW USERS FEEL ABOUT A BUILDING IS A CRITICAL PART OF ITS FUNCTION.

The emotional response created by buildings has a great impact on humans, especially since humans are surrounded by buildings most of their life. The author reminds us that: "The public are the architect's most important audience" (Heatherwick, 2023, p. 381).

DESIGN BUILDINGS WITH THE HOPE AND EXPECTATION THAT THEY'LL LAST 1000 YEARS.

To design buildings that last a thousand years, Heatherwick believes buildings should be adaptable and be able to inhabit different functions (Heatherwick, 2023, p. 383-385) so the building can change functions and owners over time. Building with the human cognitive system in mind would suggest that the building would also respond to something that is permanent in humans, the human brain, rather than trends which change over time.

CONCENTRATE A BUILDING'S INTERESTING QUALITIES AT THE 2-M DOOR DISTANCE.

Humans move around on the ground and therefore the eye-level distance is the most important part for the building's emotional function, explains Heatherwick (Heatherwick, 2023, p. 388).

MORE PEOPLE SEE THE BUILDING FROM THE OUTSIDE THAN THE INSIDE

THE IMPORTANCE OF THE EXTERIOR OF BUILDINGS

Only people living or working in a building will experience it on a regular basis from the inside over a longer time span, while people walking by or spending time in the area around the building will be exposed to it from the outside (Heatherwick, 2023). This applies to urban contexts which are regularly exposed to people. Heatherwick also argues that buildings can be more easily altered on the interior than the exterior. People living in a building most often have the power to alter the interior to their liking, while people walking by on the street do not have that same power to change the outside (Heatherwick, 2023). Therefore, it is important to consider the people that will experience the building from the outside, not only the people that live in the building.

COGNITIVE ARCHITECTURE

EMOTION ASSIGNS VALUE TO EXPERIENCES

Don Norman worded in the book The Design of Everyday Things (2013) why emotion is an important part of designing:

"*Cognition attempts to make sense of the world: emotion assigns value. It is the emotional system that determines whether a situation is safe or threatening, whether something that is happening is good or bad, desirable or not. Cognition provides understanding: emotion provides value judgements*"
(Norman, 2013, p. 47).

The importance of emotion in relation to urban design is how we are affected by what we perceive and how our behaviour is affected. If people find an urban setting safe, they would feel comfortable spending more time there, while if they find it threatening, they will only approach it if entirely necessary and otherwise avoid it.

Norman further states that the built environment triggers emotional responses, and that the urban setting that creates positive emotional responses will "work well and become timeless" (Norman, 2013, p. 47).

HOW WE RESPOND TO THE BUILT ENVIRONMENT

The book Cognitive Architecture by Sussman and Hollander (2021) offers insights into how humans are impacted by the built environment through psychology and neuroscience research. They offer an explanation of how humans perceive the world and our visual preferences. Our experience of the environment stems in evolution and survival, which explains why we respond to it the way we do: "We see the 'reality' nature intends us to see, the one that led to our species' survival in the past" (Sussman & Hollander, 2021, p. 2). The encouragement of the book is to design for people as if they are a part of nature, using the theory presented.

EDGES & THIGMOTAXIS

Research shows that humans have an evolutionary preference for edges, and the phenomenon is called thigmotaxis (Sussman & Hollander, 2021, p. 17-18). The phenomenon is common for both animals and people and relates to survival (Sussman & Hollander, 2021, p. 17-18). Edges have the opportunity to provide prospect and refuge, which is why humans prefer them instead of open spaces (Sussman & Hollander, 2021, p. 32).

EMOTION GIVES MEANING TO EXPERIENCES

THE BUILT ENVIRONMENT TRIGGERS EMOTION

HUMAN EXPERIENCE IS ROOTED IN EVOLUTION AND SURVIVAL
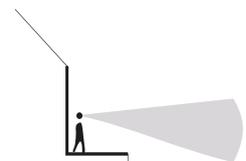
PEOPLE PREFER THE PROTECTION OF EDGES

PEOPLE LOOK FOR FACES IN THE ENVIRONMENT

FACES CAN BE FOUND IN FACADES - WHICH ENGAGES EMOTIONS

WE PERCEIVE PEOPLE DIFFERENTLY FROM DIFFERENT DISTANCES

PEOPLE PREFER CERTAIN SHAPES, SUCH AS SYMMETRY, HIERARCHY AND CURVES

PEOPLE FIND SYMMETRY APPEALING
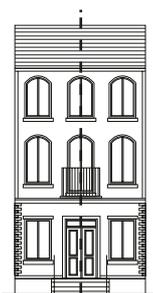
FACES IN BUILDINGS ENGAGE OUR EMOTIONS

Human perception prioritizes to make sense of people and faces, and therefore subconsciously looks for faces also in the built environment (Sussman & Hollander, 2021, p. 48). This ability was evolutionary advantageous as people were more likely to notice dangerous elements, however, we are also likely to experience faces where there are none (Sussman & Hollander, 2021, p. 59). A similar example that shows the usefulness of this ability is how you might mistake a stick for a snake – it is better to be startled by a stick one time too many than to not notice a dangerous snake.

Research shows that when we notice faces our emotions are engaged, even when the faces are not human (Sussman & Hollander, 2021, p. 61). We can notice faces based in the figural primitive, shown to the left, with the configuration and shape of elements that we quickly read as eyes, nose and mouth located on a face-like surface (Sussman & Hollander, 2021, p. 53). Therefore, we can find faces in objects or buildings, and this triggers our emotions (Sussman & Hollander, 2021, p. 61).

THE SOCIAL FIELD OF VISION

Research shows that the distances from which people experience something matters, especially because it impacts how they see the other people in the space (Sussman & Hollander, 2021, p. 75). People are important to people, and therefore, the way we experience them, impacts what we feel about the space we are in (Sussman & Hollander, 2021, p. 75). Spaces must be created for humans to be able to perceive other humans at different scales in different settings at a social and emotional level.

SHAPES

Research shows that people unconsciously respond to and prefer some shapes rather than others, and therefore, shapes matter (Sussman & Hollander, 2021, p. 97). The preferred shapes have symmetry, hierarchy and curves.

SYMMETRY

People have an evolutionary preference for symmetry, that also applies to the built environment (Sussman & Hollander, 2021, p. 97). Humans are bilaterally symmetrical and our abilities of "vision, cognition and locomotion" are possible because of this (Sussman & Hollander, 2021, p. 106-107). Sussman and Hollander writes "Bilateral symmetry not only influences the way we walk or how we see but also appears to deeply connect to our emotions and inform what we like and find attractive in people and other animate and inanimate things in the world" (2021, p.107).

HIERARCHY

Hierarchy often occurs where there is symmetry, and both features implies that the design is intentional (Sussman & Hollander, 2021, p.112). Hierarchy is found in the human face or body with head, body and feet and resembles the tripartite hierarchy which is found in traditional architecture (Sussman & Hollander, 2021, p.112). Sussman and Hollander suggests that the frequency of hierarchy in architecture is due to our familiarity and easy interpretation of the shape (Sussman & Hollander, 2021, p.112).
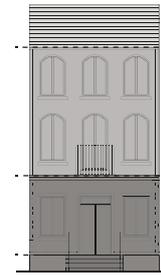
CURVES

People prefer curves compared to straight or sharp lines and according to studies, curves trigger "happiness and elation" while sharp shapes relate to "pain and sadness" (Sussman & Hollander, 2021, p. 111). Curves occur frequently in nature, while straight lines are rare, and Sussman and Hollander links the preference for curves to brain processing: "Repetitive parallel lines do not occur in nature, so our brain has not evolved to efficiently take them in, requiring more oxygen uptake to the visual processing part of the brain" (Sussman & Hollander, 2021, p.114). From an evolutionary perspective, threats to humans often had sharp edges like teeth and it would be beneficial for people to discover these quickly (Sussman & Hollander, 2021, p.115).

"*Psychologically, part of our brain still feels a lion could be at the gate, even as we sit in the living room of a high-rise or suburban tract house*"
(Sussman & Hollander, 2021, p.115).

ORGANISED COMPLEXITY

People prefer organised complexity, and we unconsciously gaze towards buildings that show this characteristic (Sussman & Hollander, 2021, p.116-117). There needs to be a balance of simplicity and complexity, so we don't get either bored or confused (Sussman & Hollander, 2021, p.117). Mathematician Nikos Salingaros explains the idea as the brain trying to create meaningful ordering of the vast amounts of stimuli humans are exposed to at all times (Hollander et al., 2021). There needs to be balance. Salingaros writes "Randomness overwhelms our sensory apparatus, which tries to interpret every single unrelated detail of the environment—becoming a cognitive burden that uses up the brain's energy. Symmetries and connections organize components and reduce randomness" – and this in turn benefits survival (Hollander et al., 2021).

NARRATIVE & SEQUENCE

"How we see our world and how we see ourselves ultimately involves a story" (Sussman & Hollander, 2021, p.122). Humans can and want to create stories as a way to draw meaning from the experienced environ-

HIERARCHY IS
FAMILIAR

CURVES RECUR
MORE OFTEN IN
NATURE THAN
STRAIGHT LINES

ORGANISED
COMPLEXITY
HELPS THE BRAIN
INTERPRET THE
ENVIRONMENT

NARRATIVE
PROVIDES MEANING

ment, and it helps us connect to our surroundings (Sussman & Hollander, 2021, p.122-124). Narrative and storytelling can be incorporated into architecture to satisfy this need through spatial sequence and creating intentional journeys through for example urban spaces or within rooms (Sussman & Hollander, 2021, p.123-124).

NATURE AS CONTEXT

NATURE IS HUMANS' EVOLUTIONARY CONTEXT

Nature can reduce stress and create positive emotional responses and urban greenery can enhance health in the urban population (Sussman & Hollander, 2021, p.141). E. O. Wilson wrote in the book Biophilia (1984) that humans respond to the environment in a way that reflects the species long-term evolution and that humans "focus on life and lifelike processes". As mentioned by Christopher Alexander, this natural experience can be described and reflected in architecture too. The importance of nature as the context of human evolution as well as the idea of including nature and natural characteristics should be considered by architects working in the urban realm to trigger positive emotional responses.

THEORY OF AFFORDANCES

THE ENVIRONMENT AFFECTS HUMAN BEHAVIOUR

The theory of affordances explains that affordances is something of value that the environment offers or provides humans and other animals, relative to each species and their perception (Gibson, 2015, p. 119-120, 125). It could be a chair, offering the affordance of sitting or a door handle, providing the option of opening a door. Affordances are more likely to be interpreted if the environment or object is proportionate with the observer (Gibson, 2015, p. 134). Therefore, in order to intentionally create affordances, it is important to understand the scale and the sensory system used for perception. "The environment constrains what the animal can do" (Gibson, 2015, p. 135) – affordances hint at what possible actions are in the environment, which should be explored or avoided relative to the human scale. In a human built environment, it is important to understand the effect of affordances and take into consideration what actions it should or should not instigate in humans. An object that is sittable, like a low, wide wall, could function as a chair, but a chair that is 10 times the size of a normal human chair becomes something else. Or as illustrated by Gehl, in order to create spaces where people want to spend time in, certain conditions or affordances must be in place. The same goes for creating positive emotional responses.

DESIGN BASED ON HUMAN PERCEPTION

The theory of affordances offers a philosophy of designing with the intention of a specific outcome based on the perception of the human species, the outcome being to trigger positive emotional responses in an urban setting.

CHAPTER 3: SYNTHESIZING PRINCIPLES

MAIN PRINCIPLES: THE EMOTIONAL FUNCTION OF BUILDINGS AFFECTS WELLBEING

The background of this thesis is research which highlights how the emotional responses triggered by the built environment create long-term impacts on human well-being. Through the research of the theoretical approaches, many principles and strategies have been presented that can positively impact these emotional responses. I suggest grouping the findings of the first part of the study into three main themes that can contribute to positive emotional responses when designing.

1. **DESIGN FOR THE HUMAN SENSORY APPARATUS**
2. **EDGES**
3. **FACILITATE HUMAN INTERACTION**

These are the three main principles identified that can help architects create urban environments that trigger positive emotional responses in people. Each principle contains sub-categories that explain some aspects of how to create environments which people respond to in a positive way. Each principle responds to different scales and are context sensitive.

THE BUILT ENVIRONMENT IMPACTS BEHAVIOUR

The built environment impacts human behaviour in different ways because of our unique perceptual system, as explained through the theory of affordances. To create spaces that people want to approach and spend time in, the human experience and scale must be considered.

REQUIREMENTS & TASKS FOR DIFFERENT SCALES

Different architectural scales have specific requirements that they must fulfil in order to facilitate an environment that triggers positive emotional responses in people. The defined scales and requirements vary through the sources, but the ones that are used further in the thesis are an interpretation of the scales Heatherwick (2023) uses in the Humanise Rule, as these are useful for the urban scale and the development of principles, but not including the larger city scale which is often already decided and difficult to change in existing urban environments. The content and tasks of the different scales are rooted in Gehl's Life Between Buildings (2010). The scales are the neighbourhood scale, street scale and building edge scale.

The neighbourhood scale must facilitate pedestrian movement and assembly of people with variation in function and buildings facing the street. The neighbourhood should have short distances between public spaces and avoid spreading buildings out with long distances between them.

THE STREET SCALE
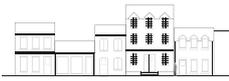
The street scale should facilitate human interaction and human dimensions visually and functionally along the street and its edges. The street should create the conditions for active ground floors and thereby connecting people and contribute to a visually stimulating streetscape. The location of the street within the wider network should also be considered.

THE BUILDING EDGE SCALE
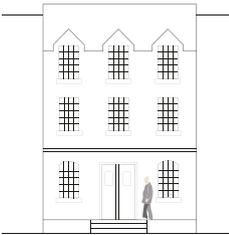
The building edge scale focuses on the immediate human bubble of perception that is important for behaviour. Its main task is to create favourable conditions and visual stimulation for different activities so that people have positive emotional responses and spend more time in the urban environment which again furthers human co-presence and contact. The building edge scale includes edges which are the zones of transition and visual connections between the street and inside the building, as well as places to rest or walk along. The building scale takes into consideration the facade and especially details of the façade that are within the immediate perceptual environment such as the main entrance.

ALL THE SCALES MUST WORK

The different scales have different tasks. The small scale of the immediate environment has been noted as the most important scale to create positive emotional responses in humans. The two larger scales must facilitate this response on the smaller level through functional and visual strategies based in the human perceptual system and facilitating social interaction. Overall, the different scales must satisfy the need for visual stimulation and complexity as well as human interaction at each visual distance. To create positive emotional responses in humans, the buildings and surrounding environment must work at all levels.

CONTEXT SPECIFIC

THE PRINCIPLES ARE CONTEXT SPECIFIC

Most important is the need to root the design in reality, but not a wanted or simplified reality (Alexander, 1979, p. 543). The strategies and theories presented are simplified, and the specific design contexts must be taken into consideration when applying the strategies. Therefore, the strategies that are presented in chapter 4 will be concrete, but enable different design responses so the designer can be context specific. They are guidelines for architects to create positive emotional responses. This way of constructing the strategies is based on the pattern languages developed by Alexander (1979, p. 155).

DESIGN FOR THE HUMAN SENSORY APPARATUS

Designing for the human sensory apparatus ensures that the built environment appeals as universally as possible to people. Cultural differences and trends must be considered, but regardless of time and location, the sensory system is what all humans have in common. Several of the theories presented comment on the importance of the human sensory apparatus in different ways and some strategies are already presented. Following is a summary of the most important factors to consider when designing for the human sensory apparatus synthesized from the theoretical approaches.

THE CHARACTER OF NATURE AND LIFE

The character of nature and life is about creating the same positive emotional responses that are triggered when you experience the natural environment, in the built environment. Alexander (1979) suggests spatial properties that describes this character as similar recurring features that are never exactly the same, such as trees in a forest or snowflakes.

VISUAL STIMULATION: ORDERED COMPLEXITY

The built environment should be designed with its visual stimulation rooted in the human sensory system. Humans prefer a natural environment over a built environment, and therefore spatial qualities that are similar to those found in nature. Research shows that several visual and spatial qualities are preferred by the human perception system. Ordered complexity, such as fractals, stimulates human perception and impacts us positively. Face-like features on buildings are easily processed by the human brain. Symmetry, hierarchy and curves create shapes that satisfy the human visual system. Narrative and sequence appeal to humans. All these visual and spatial qualities can contribute to creating positive emotional responses in humans.

SOCIAL FIELD OF VISION

People are important to people. The social field of vision is how we perceive humans and emotion in a spatial context. 100 m is the distance where we can identify other humans. At 35 m, we can read the emotions of others. And 22-25 m and less is called the emotional field of vision. At 7 m, more senses come into play, and at 3 m conversations are facilitated in a comfortable way. This must be taken into consideration when designing urban space to facilitate the positive emotional responses that seeing other people trigger in people.

EDGES

People prefer to stay or sit by or walk along edges. Edges provide protection on one side and overview on the other and relates to human habits of prospect and refuge. Good edge conditions can help create positive emotional responses in humans, while the lack of or poor edge

THE HUMAN SENSORY SYSTEM IS UNIVERSAL AND SHOULD BE CONSIDERED

THE CHARACTER OF NATURE TRIGGERS POSITIVE EMOTIONAL RESPONSES

ORDERED COMPLEXITY TRIGGERS POSITIVE EMOTIONAL RESPONSES

CONSIDER THE SOCIAL FIELD OF VISION
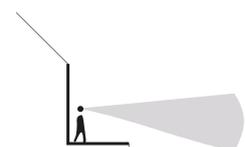
PEOPLE PREFER EDGES

conditions can create anxiety. Edges connect the interior and exterior of buildings and must create transitions between private and public and provide places for different activities and places to stay.

FACILITATE HUMAN INTERACTION

Interaction between humans create positive emotional responses and should be encouraged. This can be facilitated on different scales that connect to the human perceptual system. Facilitation of interaction between people is also rooted in the human sensory apparatus, but is more specifically directed towards creating environments in which humans are encouraged to communicate and where the built environment can strengthen the social environment. Following are summaries of the most important factors to consider when designing to facilitate human interaction according to the theoretical directions explored.

SUPPORT THE SOCIAL STRUCTURE

The built environment should support the social structure that exists or the social structure that is desired. This can be worked with on the three scales introduced: neighbourhood, street and building edge, but mostly it is facilitated on the two larger scales. The social structure includes the people that live in a specific area, but also the people that experience the built environment temporarily. The social structure needs security and good transitions between public and private areas, as well as comfortable conditions for people to socialise. Co-presence and pedestrian flow varies through contexts, and in order to predict this and its effect on the social structure, space syntax can be used (Hillier, 1996, Hillier et. al, 1993). Analysis of space syntax can measure street centrality which affects the potential for pedestrian flow and co-presence in the specific street and location.

COMFORTABLE CONDITIONS

In order for people to spend time in the built environment for more than the necessary amount of time, comfortable conditions must be created in the urban environment. The feeling of security and comfort, as well as the recognition of the human scale must be facilitated.

CONCLUSION OF SYNTHESIS

The three main themes: "design for the human sensory apparatus, edges and facilitate human interaction", contain principles synthesised from the theoretical approaches that can be useful when designing with the intention of triggering positive emotional responses in people. In the next chapter, these synthesised theories are translated into architectural principles that help architects build urban environments that trigger positive emotional responses in people.

HUMAN
INTERACTION
SHOULD BE
ENCOURAGED

THE BUILT
ENVIRONMENT
SHOULD SUPPORT
THE SOCIAL
STRUCTURE

CREATE
COMFORTABLE
CONDITIONS FOR
LONGER STAYS
OUTSIDE

CHAPTER 4: ARCHITECTURAL PRINCIPLES

PRINCIPLES TO TRIGGER POSITIVE EMOTIONAL RESPONSES

The main contribution of the thesis is architectural principles that guide architects towards creating human cities by designing spaces that trigger positive emotional responses in humans. The strategies are rooted in research and developed from the synthesis of the theoretical approaches explored and presented in this thesis. The strategies are multiscalar and offer principles to create positive emotional responses focusing on designing for the human sensory apparatus and facilitation of human interaction. The theory presented has been translated into concrete spatial conditions that can create numerous design solutions so each context can be considered appropriately. This is how the strategies can help architects create designs that achieve positive emotional responses in humans.

The strategies focus on the human system of perception, and the importance of people calls for a consideration of how to best accommodate social structure and comfortable conditions through the built environment.

HOW TO USE THE PRINCIPLES

GUIDELINES FOR WELLBEING

The principles should be used as guidelines for the design process, and can be used to test the design for how it affects human wellbeing and remind the designer of the requirements for creating urban environments that promote human wellbeing through triggering positive emotional responses in people over time. Following is a description of how these principles can be used.

SPATIAL CONDITIONS FOR NUMEROUS SOLUTIONS

The principles provide spatial properties that are meant to prompt design. Similar to Christopher Alexander's Pattern Languages (1977), the principles provide either spatial relationships and conditions or propose how to lay out or what to include in the space that is being designed. This approach is meant to enable numerous designs that fit specific contexts and functions, not create one universal solution for all design situations. The principles propose specific spatial conditions and proposes solutions for how to achieve them. In an existing context, the principles can be used as a means to analyse the space and identify how the context can be improved in terms of how it creates wellbeing through triggering positive emotional responses.

MULTISCALAR APPROACH

The various strategies respond to three different scales: Neighbourhood scale, street scale and building edge scale. The scale that each strategy applies to is indicated. All the scales must be dealt with in order to create an environment that triggers positive emotional responses. The neighbourhood scale deals with urban planning and distribution of buildings

PRINCIPLES TO HELP ARCHITECTS TRIGGER POSITIVE EMOTIONAL RESPONSES

THE PRINCIPLES ARE MULTISCALAR AND BASED IN RESEARCH

SPATIAL PRINCIPLES WITH NUMEROUS DESIGN OUTCOMES
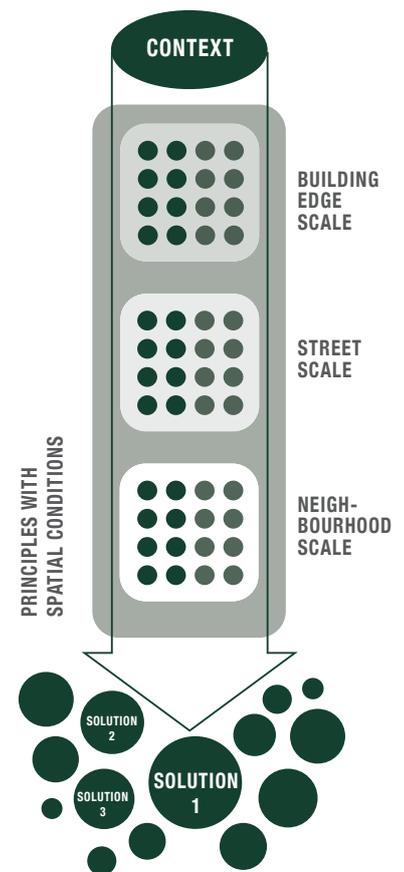
**MULTISCALAR:
NEIGHBOURHOOD,
STREET & BUILDING
EDGE SCALE**

and streets in the neighbourhood. The street level scale applies to the length and width of the street and its overall requirements. The building edge scale relates to the immediate environment of human perception such as the street sidewalk, building edges and facades.
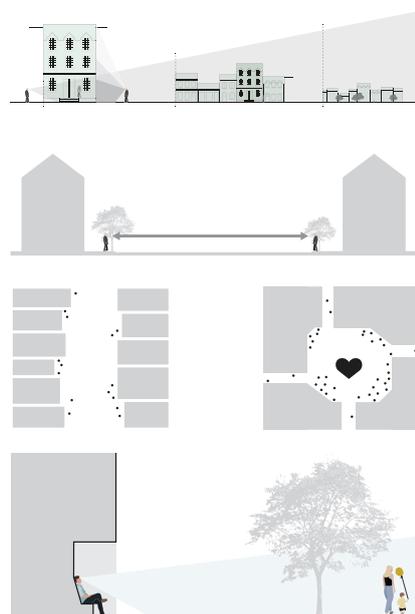
SPECIFIC CONTEXT & SPACE SYNTAX

**SPACE SYNTAX CAN
BE USED TO
UNDERSTAND
PEDESTRIAN
MOVEMENT**

Space syntax can be applied as a reconized means of analysing specific contexts to better understand how the principles can work in a favourable way. Space syntax anaysis can measure street centrality, which can identify the potentials for generating pedestrian movement and co-presence for specific locations and streets (Hillier, 1996, Hillier et. al, 1993). This type of analysis is useful to understand when applying the principles because it can tell us about the potential for co-presence which can trigger positive emotional responses, and the amount of people that are likely to be exposed to specific views or areas, and therefore how many people are impacted either postively or negatively through emotional responses.

DEGREE OF EXPOSURE

**MORE EXPOSURE
TO PEOPLE, MORE
IMPACT ON
EMOTIONAL
RESPONSES AND
HIGHER POTENTIAL
FOR CO-PRESENCE**

The degree of exposure is also important to consider when applying the principles to a design context. The more people that are present in an area, the more impact the built environment in that area will have on human wellbeing in the sense of emotional responses over time. If an area is especially exposed to large amounts of people compared to others, it should be given considerable attention in relation to its impact on human wellbeing. The amount of people in the area also affects co-presence, which can trigger positive emotional responses in people. If there are more people present, the higher potential there is for triggering positive emotional responses through co-presence.

**HOW IT CREATES
POSITIVE
EMOTIONAL
RESPONSES**

MAIN PRINCIPLES

**DESIGN FOR THE
HUMAN SENSORY
APPARATUS**

**ORDERED
VISUAL COMPLEXITY**

**VISUAL EXPOSURE
TO OTHER PEOPLE**

**FACILITATE HUMAN
INTERACTION**

**SUPPORT THE
SOCIAL STRUCTURES**

GOOD EDGES

**DEFINE EDGES AND
CREATE GOOD CONDITIONS
FOR STAYING ALONG THEM**

**PRINCIPLE 1:
ORDERED VISUAL COMPLEXITY**

**PEOPLE PREFER ORDERED VISUAL
COMPLEXITY.**

**IT IS CREATED THROUGH A BALANCE OF
ORDER AND COMPLEXITY OF BUILDING
PARTS IN RELATION TO SCALE.**

**ORDERED VISUAL COMPLEXITY DEPENDS
ON CONSISTENCY ACROSS SCALES.**

**FOCUS ON THE
IMMEDIATE
ENVIRONMENT**
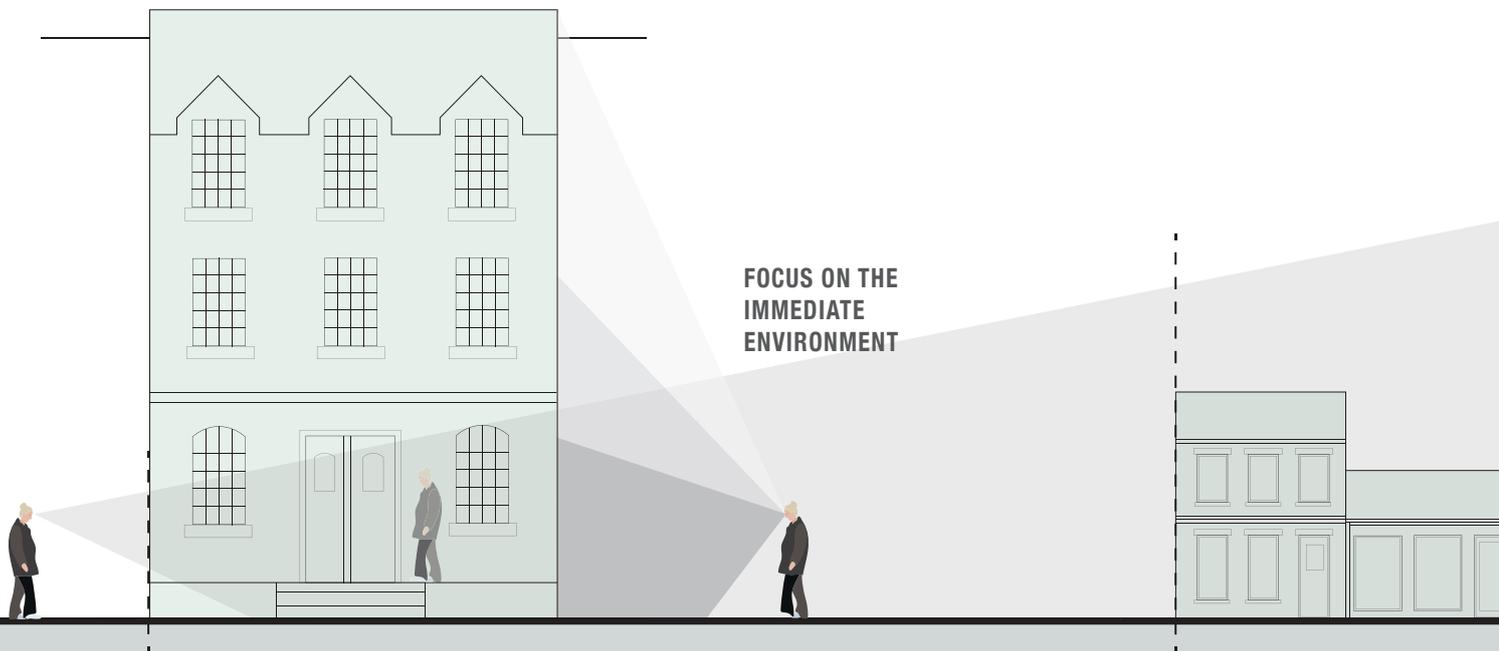
BUILDING EDGE SCALE

**BUILDING VOLUME
HIERARCHY OF BOTTOM-MIDDLE-TOP
DISTRIBUTION OF FACADE ELEMENTS
VARIATION OF DETAILS IN FACADE ELEMENTS
THREE-DIMENSIONAL FACADE ELEMENTS
MAIN ENTRANCE
CONSTRUCTION DETAILS
FUNCTIONAL DETAILS
MATERIAL TEXTURE
MATERIAL ARRANGEMENT
COLOR
ORNAMENTATION
CHARACTER
ACCENTUATED GROUND FLOOR
HOW THE BUILDING MEETS THE GROUND**

STREET SCALE

RELATIONSHIP BETWEEN &
PATTERNS ACROSS BUILDINGS:
SHAPE AND SIZE
MATERIALITY
VERTICAL FACADE ARTICULATION
HIERARCHY OF BOTTOM-MIDDLE TOP
COLOUR SCHEMES
THREE-DIMENSIONAL FACADES
CONNECTING BUILDINGS

NEIGHBOURHOOD SCALE

PLOT GRAIN
BUILDING SHAPE AND SIZE
ROOFSCAPE
CHARACTERISTICS OF THE AREA

BUILDING PARTS AND LEVEL OF DETAIL

The above lists of building parts sorted into different scales provide an overview of elements that can be used to balance the ordered visual complexity at different levels. Each building element can either contribute with order or complexity, depending on how it is used.

ORDER AND COMPLEXITY
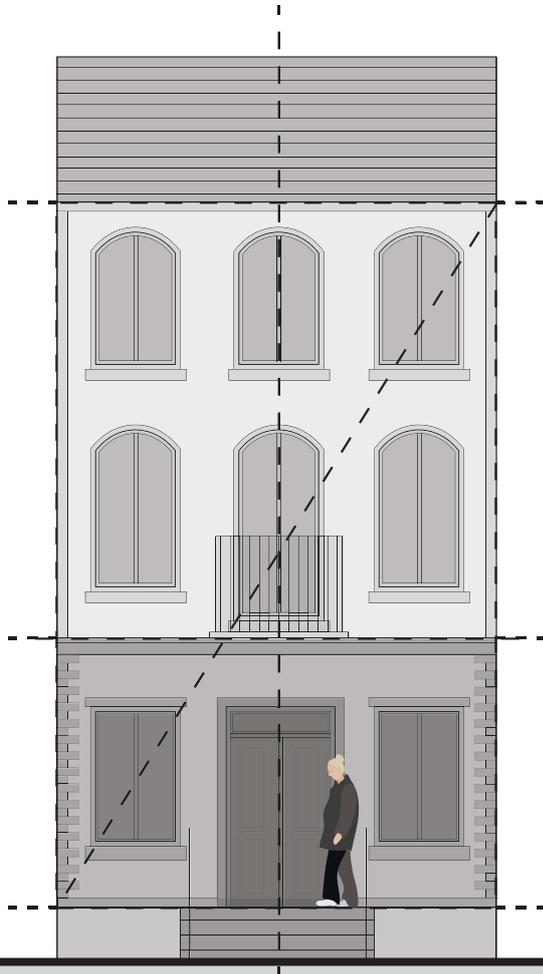
ORDER

SYMMETRY
HIERARCY
MIMICKING FACES
THE GOLDEN RATIO
FRACTALS
CLEAR CENTERS
BOUNDARIES
CONTRAST
VOID
SIMPLICITY

COMPLEXITY

CURVES
LEVELS OF SCALE
ALTERNATING REPETITION
LOCAL SYMMETRIES
CONNECTED PARTS
AMBIGUITY
GRADIENTS
ROUGHNESS
ECHOES

BALANCING ORDER AND COMPLEXITY

The drawings above illustrate how different building elements can balance order and complexity by using the strategies listed such as symmetry for more order or echoes for more complexity.

LAYERING ORDER AND COMPLEXITY THROUGH BUILDING ELEMENTS

The balance between order and complexity to achieve visual ordered complexity comes from layering of the different building elements on the different scales. Below are examples of how order and complexity can affect the overall ordered visual complexity through layering.

HOW ORDER CAN AFFECT DIFFERENT BUILT ELEMENTS
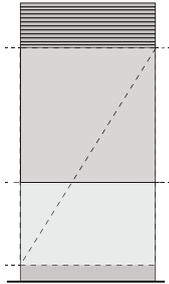
BUILDING VOLUME AND HIERARCHY OF BOTTOM-MIDDLE-TOP & GOLDEN RATIO
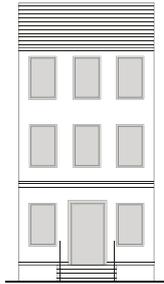
DISTRIBUTION OF FACADE ELEMENTS AND SYMMETRY AND FACE
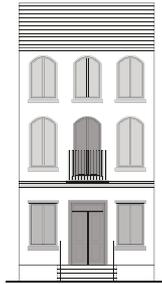
VARIATION OF DETAILS IN FACADE ELEMENTS ACROSS LEVELS WITH HIERARCHY AND CREATION OF A CLEAR CENTER
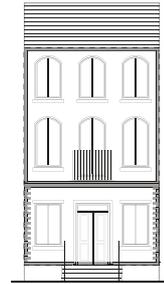
MATERIALITY AND OR-NAMENTATION CREATES BOUNDARIES
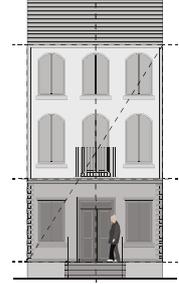
OVERLAY OF ALL ELEMENTS

HOW COMPLEXITY CAN AFFECT DIFFERENT BUILT ELEMENTS
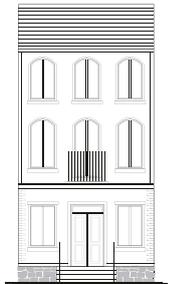
ROUGHNESS AND ECHOES IN MATERI-ALITY AND HOW THE BUILDING MEETS THE GROUND
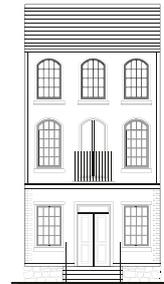
WINDOW DETAILS WITH LOCAL SYMMETRIES
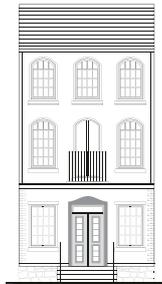
ORNAMENTATION ON MAIN ENTRANCE WITH CURVES, BOUNDARIES AND LOCAL SYMME-TRIES
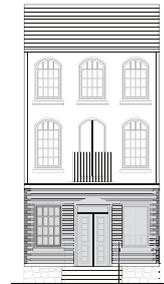
ALTERNATING REPETI-TION OF MATERIALITY TO ENHANCE GROUND FLOOR VISIBILITY
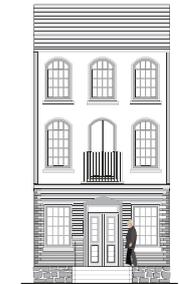
OVERLAY OF ALL ELEMENTS

EXAMPLE OF LAYERING FROM EXISTING BUILDING:
SPAARNDAMMERHART HOUSING BY MARCEL LOK ARCHITECT & KORTH TIELENS ARCHITECTS

Diagram drawn by author according to elevation created by architect. Retrieved from Archdaily.
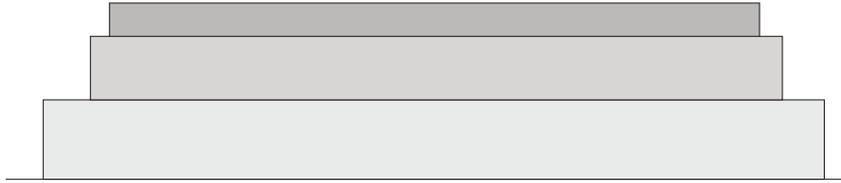
BUILDING VOLUME AND HIERARCHY OF BOTTOM-MIDDLE-TOP
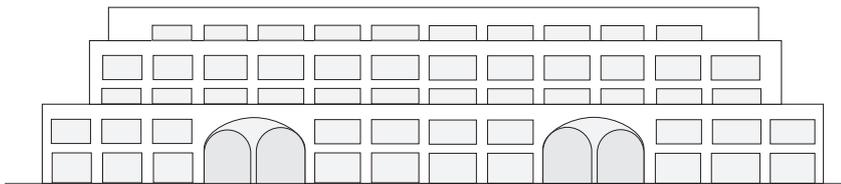
SYMMETRIC DISTRIBUTION OF FACADE ELEMENTS AND
CREATING CLEAR CENTERS FOR MAIN ENTRANCES
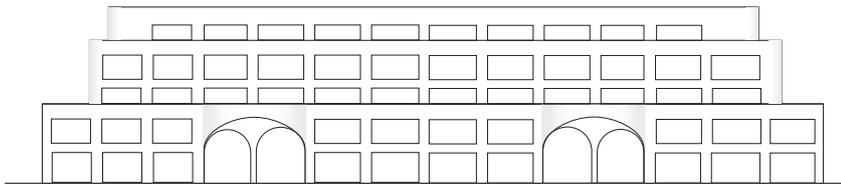
CURVED BUILDING CORNERS AND EXTRUDED FACADE ELEMENT

WINDOW DETAILS WITH LOCAL SYMMETRIES

MATERIAL ARRANGEMENT AND PATTERNS CREATED BY BRICK

THE PRINCIPLE EXPLAINED

Ordered visual complexity triggers positive emotional responses in humans, and this spatial condition relates to human vision, experience and scale.

CONSISTENCY OF SCALES

Most importantly, the ordered visual complexity needs to be consistent at all scales and the complexity of each scale must relate to the distance which humans perceive it from. The closer to the building the observer is, the more complexity is needed. This relates to the social field of vision and how humans perceive more details about other humans, the closer they are.

CREATE BALANCE THROUGH ORDER AND COMPLEXITY

Ordered visual complexity can be balanced using different strategies to acheive either more order or complexity. Order can be created by amongst other characteristics: symmetry, hierarchy, contrast and simplicity. Complexity can by increased by amongst other features: shape, repetition, scales and roughness. The list on the previous page offers spatial qualities which each relate to either order or complexity. The opposites of order and complexity, chaos and monotony, illustrated to the left must be avoided.
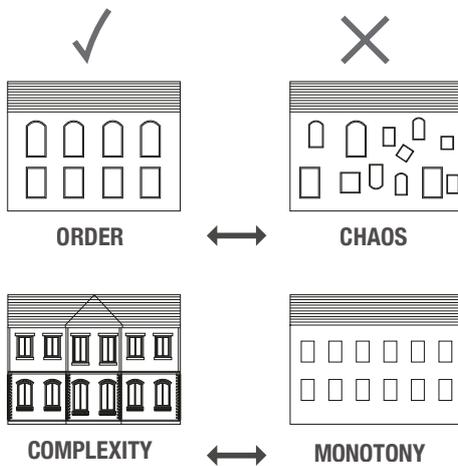
DIFFERENT BUILDING PARTS AT DIFFE-RENT SCALES HELP BALANCE ORDER AND COMPLEXITY.
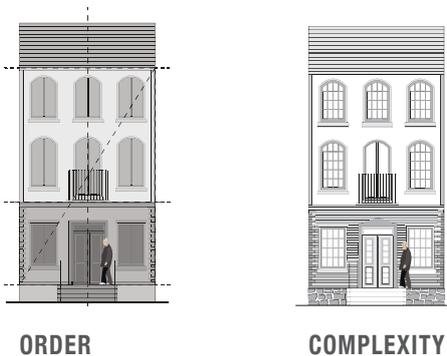
ORDER   COMPLEXITY

BUILDING PARTS AND LEVEL OF DETAIL

All parts of the building impact the ordered visual complexity at different scales and can contribute to both order and complexity. When designing the building, each part must relate to the level of scale and distance which they are perceived from. For example, the massing of the building is perceived from a significantly larger distance than the entrance door and the attention to detail must therefore be stronger at the smaller scale. Placement of windows have a larger impact on the street distance, than from the building edge distance where the details of the windows are more significant.

On the previous pages are full overviews of the building parts that can affect the order and complexity at different levels.

PRINCIPLE 2:
VISUAL EXPOSURE TO OTHER PEOPLE

PEOPLE PREFER TO SEE OTHER PEOPLE.

CREATE INTENSITY AND EXPOSURE OF PEOPLE IN SPACE, RATHER THAN OVERDIMENSIONING SPACES.

FOLLOWING ARE MAXIMUM DISTANCES FOR MEANINGFUL VISUAL EXPOSURE TO PEOPLE AT DIFFE-RENT SCALES.

3 METERS

25 METERS

MORE INTENSITY

MAX

100 METERS

MAX
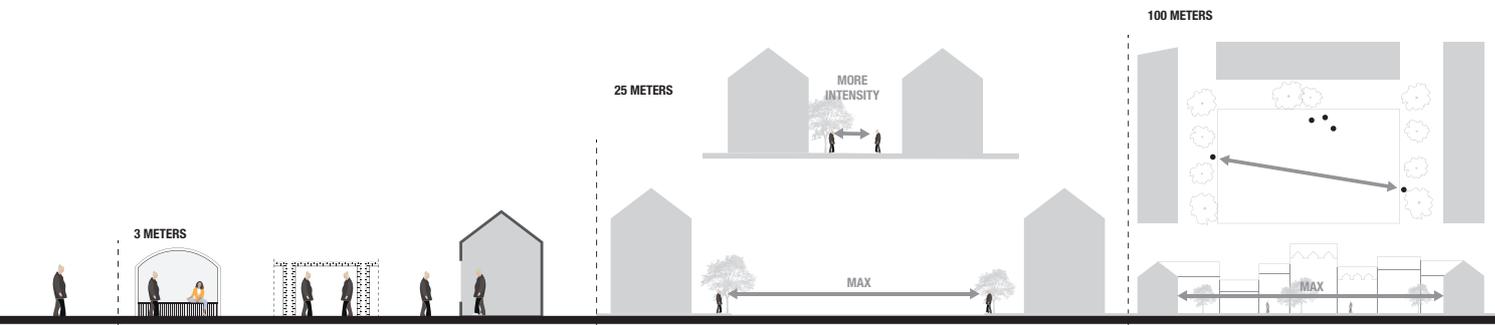
MEET AT BUILDING EDGE SCALE SPACES FOR CONVERSATION

Around 3 meters should define spaces for conversation so people can hear and see sufficiently, but not be too close.

CONNECT AT STREET SCALE

Maximum 25 meters as width of street to be able to read emotion of other people. Smaller distances create more intensity.

INVITE AT NEIGHBOURHOOD SCALE

A radius of 100 m or less in a public space or square to identify human activity.

CONNECTING INSIDE AND OUTSIDE

It should also define the distance between the people on the street and inside.
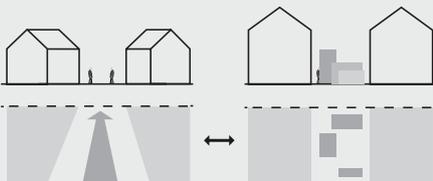

FRAME, NOT DISRUPT AT ALL SCALES

Different levels or other obstacles disrupt visual connections between people at different scales and should be avoided or used to mediate and frame visual connections between people.
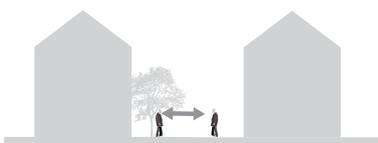
THE PRINCIPLE EXPLAINED

A visual exposure to people trigger positive emotions in an urban context and should be facilitated according to the abilities of human vision. There is a maximum distance for extracting different amounts of information about other people in an urban context that designers can follow. However, to acheive intensity of people, spaces should not be made too large.
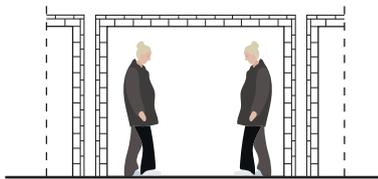
**FACILITATING
MEETINGS AT 3 METERS.**

MEET AT BUILDING EDGE SCALE

When designing at the building edge scale, distances are reached that facilitate communication. From 7 meters and less, other senses than the visual sense becomes more engaged, and we can hear and gather more information from the environment and other people. At around 3 meters distance is the social distance where communication between people happens. To facilitate the richest experience of the environment and other people, these distances, and especially the 3 meter distance should be the threshold for creating places to meet. This could be a sidewalk where people walk along together or a niche with benches where people sit and talk. The 3 meter mark should also define the distance between people inside and outside a building. However, the density of people in the space must be taken into consideration in order for the space to not become too large and lose its intensity or too small and become too crowded.

**CONNECTING PEOPLE AT 25
METERS OR LESS.**

CONNECT AT STREET SCALE

The emotional field of vision is a distance of 25 meters or less, from which humans can perceive the facial expressions of other people. This should guide the maximum width of the street, so people can observe situations and read people within this boundary, which contributes to the feeling of security and allows for people to connect with the life of the street.


INVITE PEOPLE FROM 100 METERS.

INVITE AT NEIGHBOURHOOD SCALE

The distance of 100 meters is the largest distance where humans can perceive other people and should be the maximum radius of squares and public spaces. From 100 m and under, it is possible to get an overview of activities and people. However, public spaces should not be unnecessarily big so they lose their intensity.

PRINCIPLE 3:
SUPPORT SOCIAL STRUCTURES
THE BUILT ENVIRONMENT SHOULD SUPPORT THE EXISTING OR DESIRED SOCIAL STRUCTURE AT STREET AND NEIGHBOURHOOD LEVELS.

FINER PLOT GRAIN

Finer grain plot types increase variation in function and subdivision of buildings according to social structures, as well as increase visual diversity.
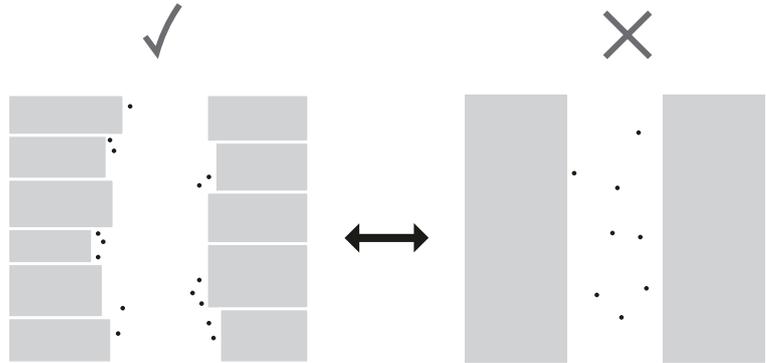
"SHORT" ROUTES

Facilitate well-connected networks as well as routes that are intelligible and easy to navigate by way of perceptual and cognitive distance between points of interests, which creates places of high street network centrality that in turn create conditions for higher pedestrian flows and co-presence (Hillier et al. 1993, Stavroulaki et al. 2019, Berghauser Pont et al. 2019).
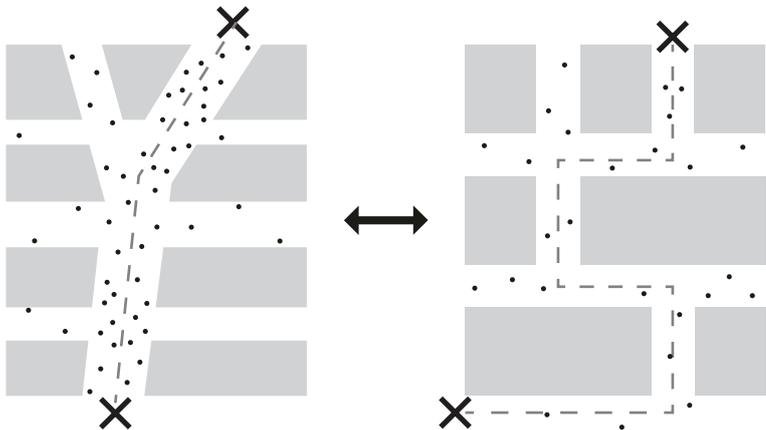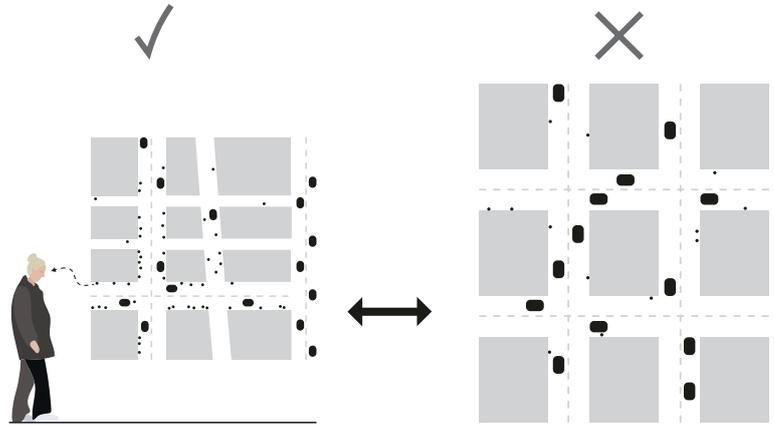
PUBLIC PLACES TO STAY

Provide well designed public places where people can stay for a longer time.
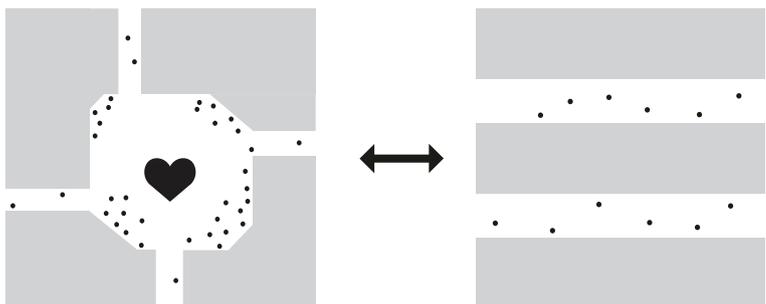
PRIORITIZE PEDESTRIANS

Pedestrians should be prioritized over cars, and if the presence of cars is necessary, pedestrians should be protected in a way that favors the pedestrian.
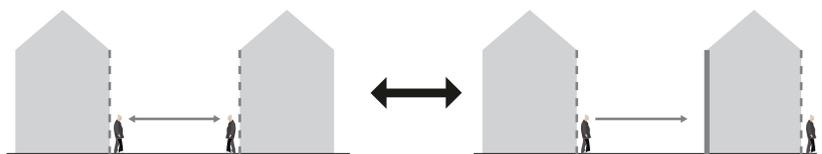
PROVIDE ACTIVITIES

Provide activities to attract people and give an incentive to get them to stay. The longer time spent outside, the more people are present in the urban scene and trigger positive emotional responses.
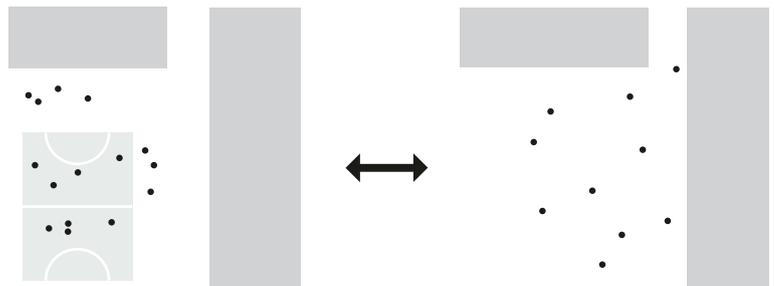
FACING BUILDINGS

Building fronts should face each other to facilitate meetings and activity along the street.

THE PRINCIPLE EXPLAINED

PRIORITISING PEOPLE LEADS TO POSITIVE EMOTIONAL RESPONSES

The built environment should support the existing or desired social structure of neighbourhoods and streets. By facilitating these principles, architects prioritize people, places for people and activity that includes people. This makes the presence of people in the urban environment more likely, and therefore positive emotional reponses are more likely to be triggered for people who experience this environment.

PRINCIPLE 4:
CREATE GOOD EDGE CONDITIONS
### DEFINE EDGES AT NEIGHBORHOOD AND STREET SCALE.

STREET CORRIDORS

Edges need to be defined on the neighbourhood level by street corridors. Provide a view at the end of or along the street corridor. Street corridors relate to dense or compact density types.
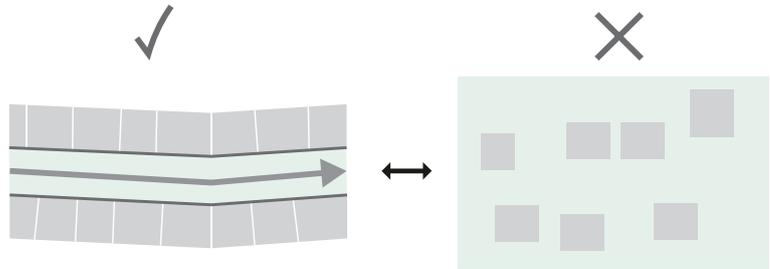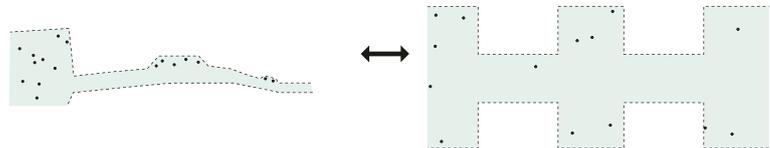
CONTINUOUS EDGES

Edges are continuous along the street across units and plots. Avoid setbacks, blind or passive units, provide cover, enough space for moving along and good ground conditions.
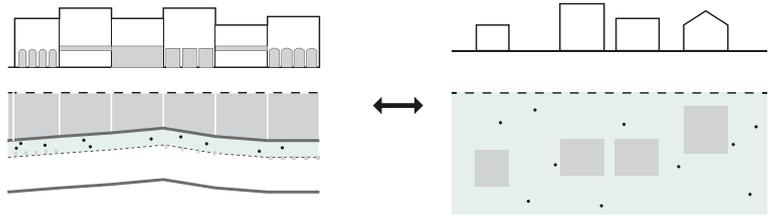
HIERARCHY OF EDGES

Provide diversity and hierarchy of places to stay of different sizes along the edges.

BUILDING EDGES SHOULD CONNECT THE INSIDE AND OUTSIDE OF BUILDINGS THROUGH A VISUAL CONNECTION AND TRANSITION OF PUBLIC TO PRIVATE.
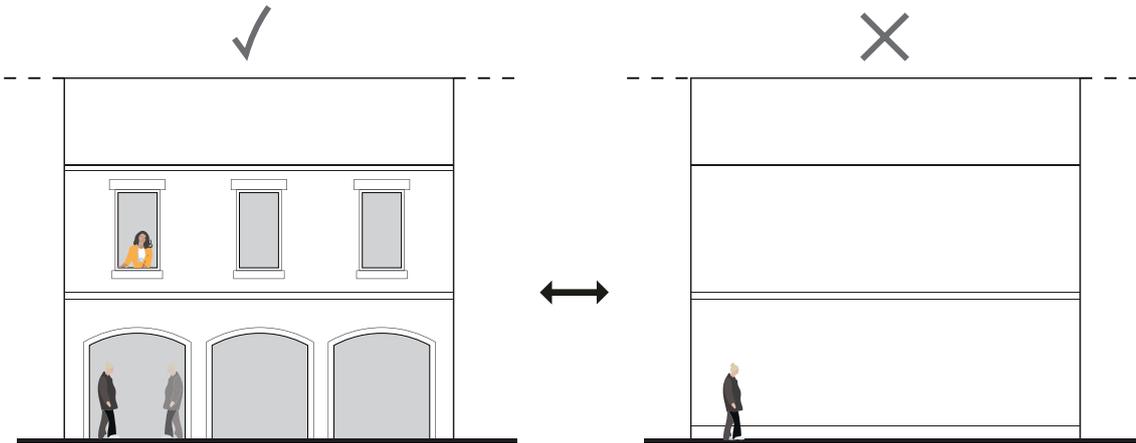
OPEN UP

Open the building into the street physically, and if not possible, visually.

INSIDE   TRANSITION   OUTSIDE
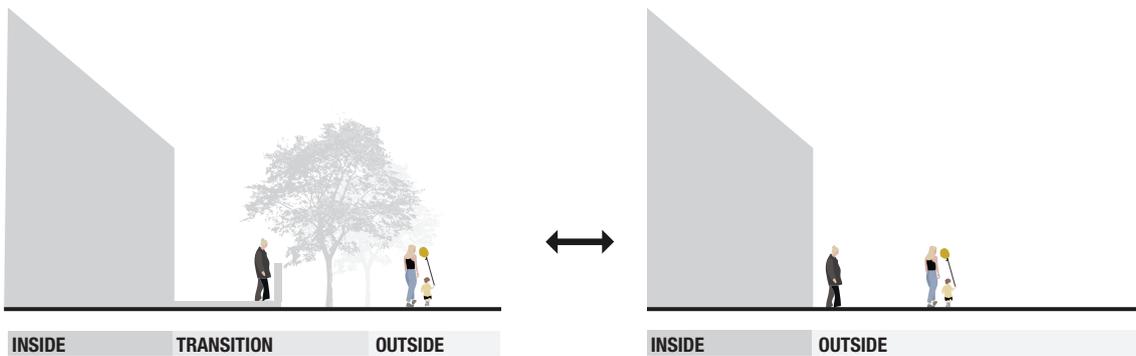
INSIDE   OUTSIDE

TRANSITION OF PRIVACY

Create a gradient of privacy from the street to the building edge to ease the transition between the inside (private) and the outside (public).

EDGES SHOULD PROVIDE PLACES TO STAY THAT PROVIDE PROSPECT AND REFUGE AND INVITES LONGER STAYS.

PROTECTED PLACE TO STAY
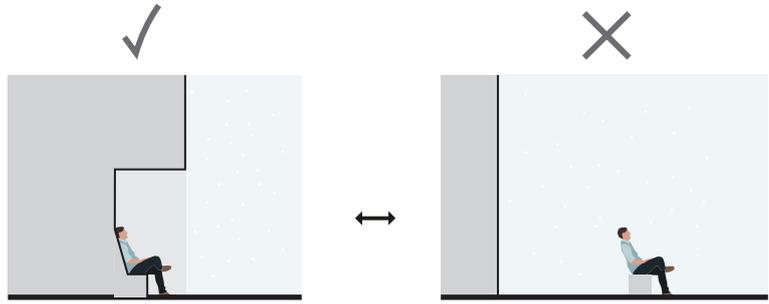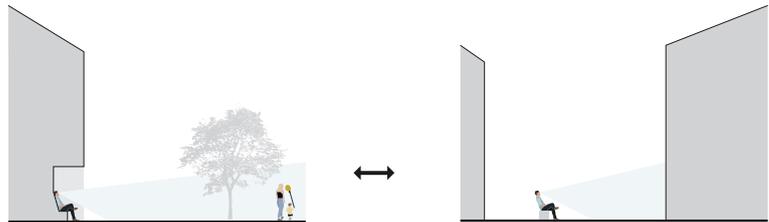
Provide a defined place to stay where people are protected from weather and have their backs against the wall.

VIEWS

Provide a view of other people, an activity or something in the distance.

SEATING FOR DIFFERENT INTENSITIES

Provide primary seating such as benches along edges for an appropriate number of people, but also secondary seating such as supports or steps for periods where many people are present in the area and to avoid loss of intensity when there are fewer people present.
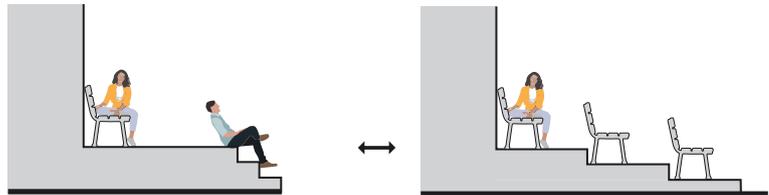
PROVIDE AN ACTIVITY

Provide an activity to incentivize longer stays along the edges and facilitate social interaction.
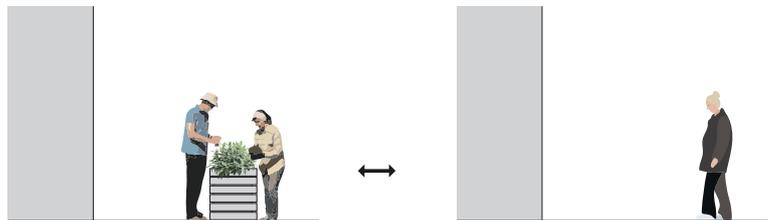
THE PRINCIPLE EXPLAINED

Good edge conditions for people to stay in or move through can help facilitate an urban environment that triggers positive emotional responses and relates to the concept of prospect and refuge. Clear and good edge conditions are defined at the larger neighbourhood and street scale and facilitates comfortable stays at the building edge scale.

EDGES ARE FAVOURABLE AND MUST BE FACILITATED AT ALL SCALES

SUMMARY OF ARCHITECTURAL PRINCIPLES

1. ORDERED VISUAL COMPLEXITY

- PEOPLE PREFER ORDERED VISUAL COMPLEXITY.
- IT IS CREATED THROUGH A BALANCE OF ORDER AND COMPLEXITY OF BUILDING PARTS IN RELATION TO SCALE.
- ORDERED VISUAL COMPLEXITY DEPENDS ON CONSISTENCY ACROSS SCALES.

2. VISUAL EXPOSURE TO OTHER PEOPLE

- PEOPLE PREFER TO SEE OTHER PEOPLE.
- CREATE INTENSITY AND EXPOSURE OF PEOPLE IN SPACE, RATHER THAN OVERDIMENSIONING SPACES.
- FOLLOWING ARE MAXIMUM DISTANCES FOR MEANINGFUL VISUAL EXPOSURE TO PEOPLE AT DIFFERENT SCALES.

    3 METERS FOR SPACES FOR CONVERSATION.
    25 METERS FOR STREET WIDTH.
    100 METERS FOR PUBLIC SPACE.

3. SUPPORT THE SOCIAL STRUCTURES

- THE BUILT ENVIRONMENT SHOULD SUPPORT THE EXISTING OR DESIRED SOCIAL STRUCTURE AT STREET AND NEIGHBOURHOOD LEVELS.
- FOLLOWING PRINCIPLES SUPPORT THE SOCIAL STRUCTURE:

    FINER PLOT GRAIN
    SHORT ROUTES
    PUBLIC PLACES TO STAY
    PRIORITIZE PEDESTRIANS
    PROVIDE ACTIVITIES
    FACING BUILDINGS

4. DEFINE EDGES AND CREATE GOOD CONDITIONS FOR STAYING ALONG THEM

- DEFINE EDGES AT NEIGHBOURHOOD AND STREET SCALE. PRINCIPLES TO ACHIEVE THIS IS:

    STREET CORRIDORS
    CONTINUOUS EDGES
    HIERARCHY OF SPACES

- BUILDING EDGES SHOULD CONNECT THE INSIDE AND OUTSIDE OF BUILDINGS THROUGH A VISUAL CONNECTION AND TRANSITION OF PUBLIC TO PRIVATE. CONNECTION BETWEEN THE STREET AND THE BUILDING EDGE CAN BE ACHIEVED BY THE PRINCIPLES:

    OPEN UP
    TRANSITION OF PRIVACY

- EDGES SHOULD PROVIDE PLACES TO STAY THAT PROVIDE PROSPECT AND REFUGE AND INVITES LONGER STAYS. THIS CAN BY ACHIEVED BY THE PRINCIPLES:

    PROTECTED PLACE TO STAY
    VIEWS
    SEATING FOR DIFFERENT INTENSITIES
    PROVIDE AN ACTIVITY

CONCLUSION

The principles have been developed through the synthesis of research on the topic of how the built urban environment can trigger positive emotional responses in people. The synthesis has been interpreted and translated into spatial conditions that an architect can acheive at different scales.

CHAPTER 5: CASE STUDY ANALYSIS

MULTISCALAR CASE STUDY ANALYSIS USING THE PRINCIPLES

In this chapter, a spatial analysis of three case studies in two areas in Göteborg will be conducted: Masthuggkajen and Långgatorna. The areas will be analysed based on the principles outlined in the previous chapter and thereby their ability to trigger positive emotional responses in people who experience these urban contexts.

The analysis is multiscalar and follows the thematic structure of the principles. The three scales that will be analysed are the neighbourhood scale, the street scale and the building edge scale. The principles that will be used for the analysis is: Ordered visual complexity, visual exposure to other people, support the social structures, define edges and create good conditions for staying along them.

The findings of the analysis will inform the design exercise by providing examples of places that either are expected to trigger positive emotional responses or places that do not. Some places that do not, and therefore can be improved, will be developed in the design exercise.

GENERAL CONTEXT FOR ANALYSIS

MASTHUGGKAJEN

The site of Masthuggskajen is chosen as a context of analysis because it is part of a larger development of Göteborg called River City that will expand and densify the city centre. The issue of urban areas triggering negative emotional responses is not limited to older modernist buildings, but do also apply to new developments. Therefore, this case study analysis will focus on the new development that relates to both urban densification and triggering positive emotional responses.

The area will be transformed from mainly consisting of parking areas relating to the Stena Line Terminal and a few offices into a vibrant neighbourhood with more offices, public space and flats. There are a few existing buildings on the site, and several new office buildings and flats have already been built. Further plans have been developed for the remaining site. The functionalist buildings on the site came around the 1940s as part of an intensification of the industry by Masthugget. They are characterised by the yellow brick facades, symmetry and more modern expression contrasting Långgatorna. These are commercial buildings that held important functions in relation to industry when they were first built. (Ramböll Sverige AB, 2020).

The new developments of Älvestaden are different from the existing buildings on site. They are taller and more modern in their form. Masthamnsgatan will become a low speed pedestrian street connecting the

USE THE PRINCIPLES

MULTISCALAR ANALYSIS

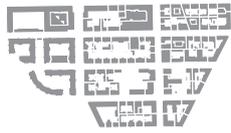**MASTHUGGSKAJEN IS IN DEVELOPMENT**

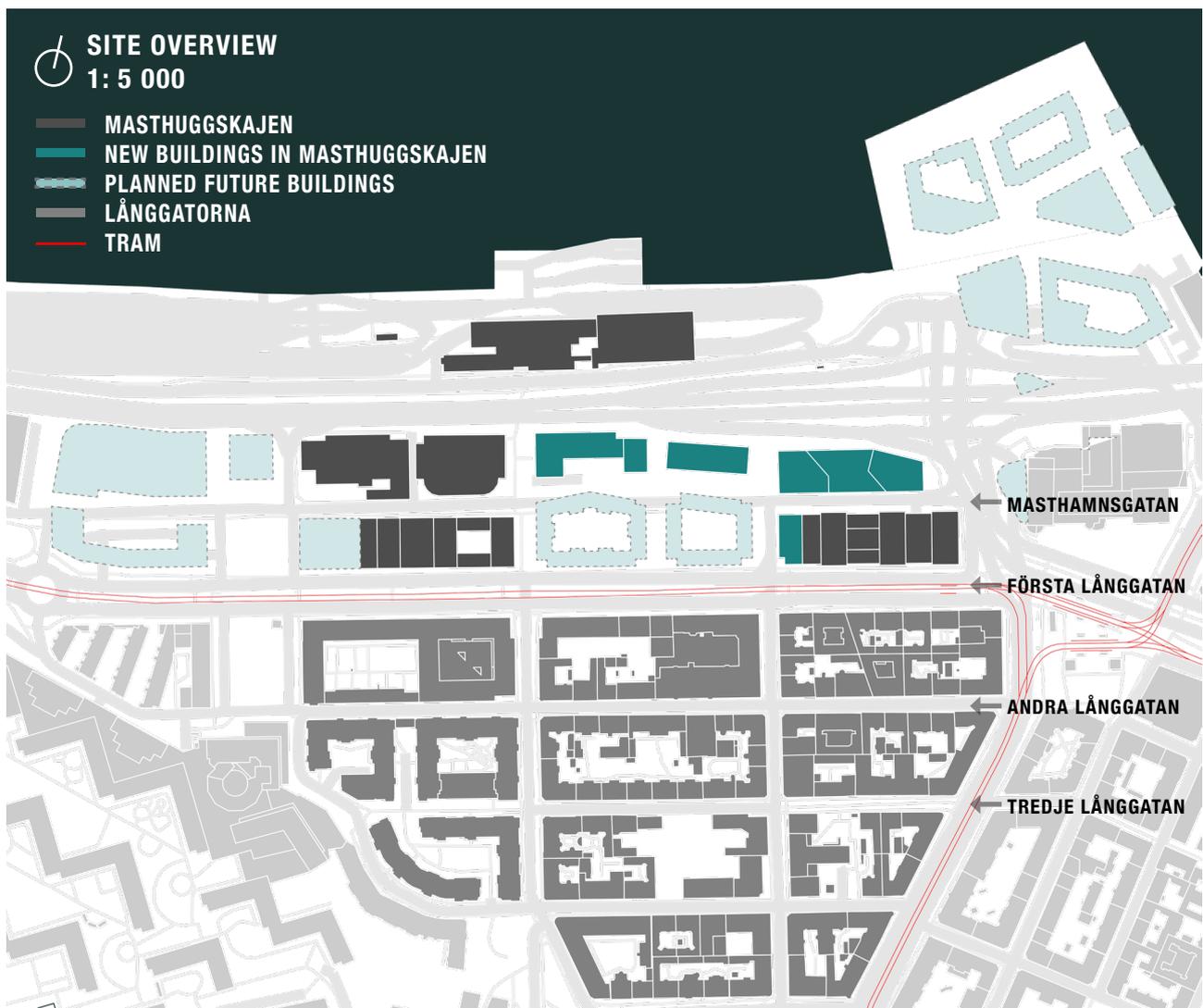**THE NEW DEVELOPMENTS ARE PART OF A CITY DEVELOPMENT PLAN**

dense mid-rise buildings through squares and paths. Greenery will also become more present on the site with 300 new trees and park areas. The facades will vary, but many of them will be covered in brick and have symmetric window patterns. (Ramböll Sverige AB, 2020). How will the proposed urban plan and buildings impact human wellbeing?

LÅNGGATORNA

Långgatorna offers a different typology to compare Masthuggkajen to as it possesses many of the principles, and lies in close proximity to the area. Långgatorna's structure was planned in 1866, but within the quarters, there has been a slow growth and changes over time which resulted in the characteristic appearance the area has today. Its main characteristics are the stone facades with vertical divisions between the buildings, different building heights, varied roofscapes, corner balconies, chamfered corners, clear division of ground floor and upper floors and narrow streets around 12 meters. The buildings mostly have a commercial function on the ground floor while the upper levels are housing (Göteborgs stadsbyggnadskontor, 2012).

LÅNGGATORNA HAS EVOLVED OVER TIME

SITE OVERVIEW
1: 5 000

- MASTHUGGSKAJEN
- NEW BUILDINGS IN MASTHUGGSKAJEN
- PLANNED FUTURE BUILDINGS
- LÅNGGATORNA
- TRAM

MASTHAMNSGATAN

FÖRSTA LÅNGGATAN

ANDRA LÅNGGATAN

TREDJE LÅNGGATAN

ANALYSING THE LOCATION: IMPACT OF STREET CENTRALITY AND BUILDING TYPE DENSITY

BUILDING EXPOSURE AND EXPOSURE TO PEOPLE

The more people pass by and experience an urban setting, the more people are impacted by the emotional responses triggered by the specific urban environment.

Heatherwick states that more people experience a building from the outside than the inside, as people walk by or see it from a distance while only the residents or office workers experience it from the inside. How many people walk by and see the buildings in an area is affected by street centrality and building density types (Berghauser Pont et al. 2019). These factors also affect how many people we are exposed to in a specific area, which links to Gehls idea that humans themselves are very important to create life and positive emotions in an urban setting.
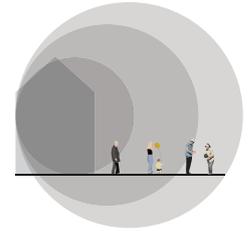
The more people experience an area or building, the larger impact it has when triggering emotional responses, which must be taken into consideration when designing a building.

MORE EXPOSURE TO PEOPLE, MORE IMPACT ON EMOTIONAL RESPONSES

STREET CENTRALITY AND BUILT DENSITY

The key spatial variables that impact how many people are co-present or move on a street or a neighbourhood are primarily street centrality and built density (e.g. Hillier et al. 1993, Berghauser Pont et al 2019, Stavroulaki et al. 2019, Bolin et al. 2010) and secondarily via ground floor uses (Stavroulaki et al. 2019).

Space syntax analysis, as mentioned in chapter 3, can be used to measure street centrality and thus, identify the potentials of the location and the specific street for generating pedestrian movement and fostering co-presence. The key spatial variable used in space syntax to measure street centrality is angular betweenness. Angular betweenness measures the potential of the street to become a through route on the way to different destinations in the city and the neighbourhood, and mediate trips in different scales. Research shows that streets with higher angular betweenness centrality have higher pedestrian flows (Hillier and Iida 2005, Stavroulaki et al. 2019).

STREET CENTRALITY AND BUILT DENSITY IMPACTS CO-PRESENCE

SPACE SYNTAX CAN MEASURE STREET CENTRALITY

Overall, the combination of angular betweenness centrality and building type density affects the amount of people that are exposed to a specific context and therefore the overall impact of the building itself in relation to triggering emotional responses. A context which has both high centrality and high density will be exposed to more people than a context which has low values (e.g. Hillier et al. 1993, Berghauser Pont et al 2019, Stavroulaki et al. 2019).
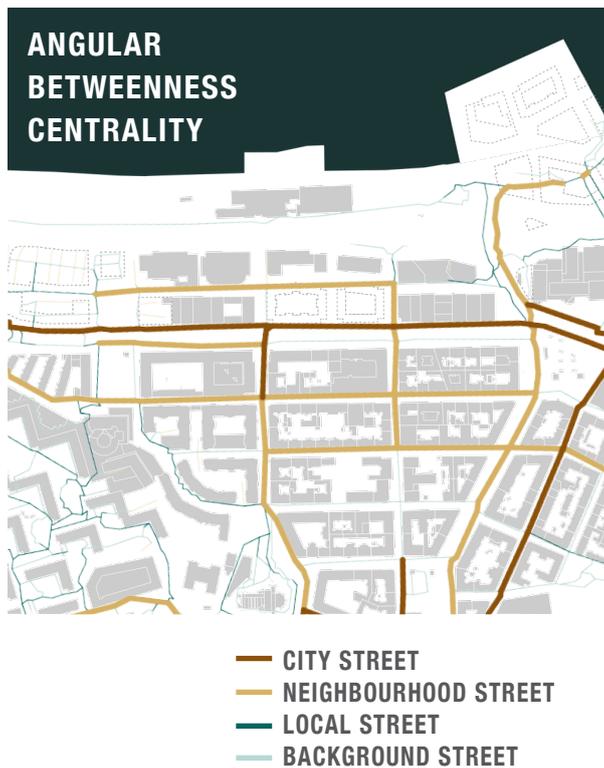
HIGHER VALUES MEANS MORE IMPACT WHEN TRIGGERING EMOTIONAL RESPONSES

ANGULAR
BETWEENNESS
CENTRALITY

━━ CITY STREET
━━ NEIGHBOURHOOD STREET
━━ LOCAL STREET
━━ BACKGROUND STREET

CASE STUDY ANALYSIS: ANGULAR BETWEENNESS CENTRALITY THROUGH THE SCALES

The figure to the left is based on a figure from Berghauser Pont et al. 2019 decribing the existing network centrality of the streets in the area through the scales, creating different street types based on the multiscalar centrality. The data is based on the current situation before the ongoing development. City streets have the highest centrality in all scales. They are main or high streets for long trips to the rest of the city, but also local trips within the neighbourhood. Together with the neighborhood streets, they are expected to have the highest flows of people. Neighbourhood

STREET TYPES CAN PREDICT MOVEMENT

streets are very central in the local context, but less central in relation to the rest of the city. They are mostly used for shorter local trips within the neighbourhood and connecting to other neighbourhoods or more central city streets. Local and background streets have lower centrality in all scales and are expected to have lower numbers of people passing by. They are more used for local shorter trips.
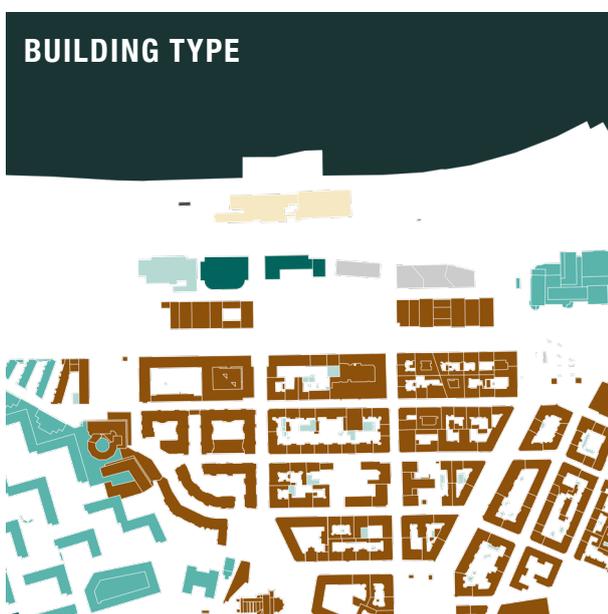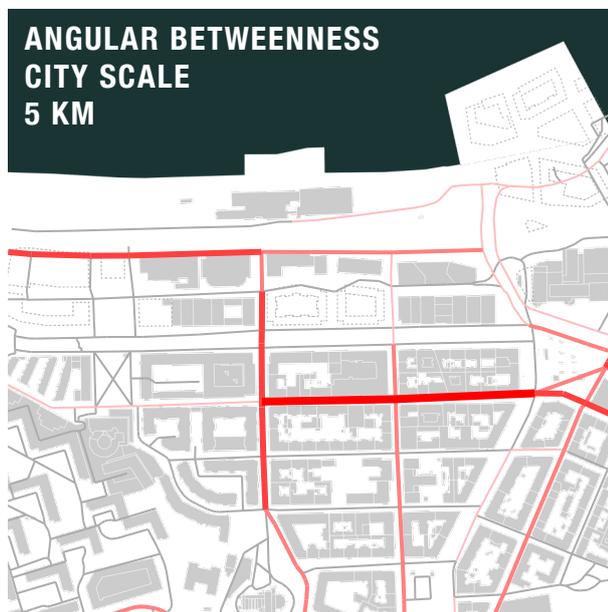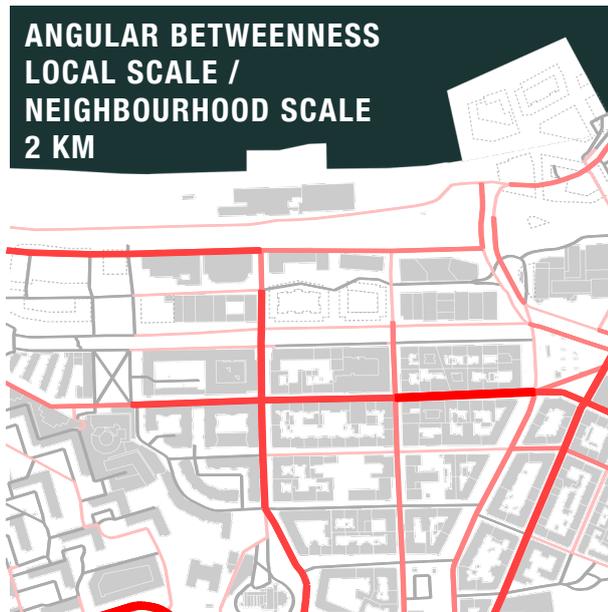
LÅNGGATORNA HAVE HIGH STREET CENTRALITY

Most of the Långgatorna area has relatively high street centrality which makes them neighbourhood streets. Första Långgatan which borders to the Masthuggskajen area is a city street, which connects to Järntorget and further towards the central city. The views seen along these city streets, and the views from Järntorget are important as they will affect many people travelling along these veins. They also have potential for high co-presence which can contribute to trigger positive emotional responses. Andra Långgatan also has potential for high co-presence due to its centrality in the neighbourhood.

MASTHAMNSGATAN IS A BACKGROUND STREET

Masthamnsgatan, based on the existing situation, is a background street, and should be designed with favourable conditions and places to stay so it does not become a service street, especially since there is a potential for many people spending time there according to the density. In order to create co-presence, favourable places to stay must be created.

**ANGULAR BETWEENNESS
LOCAL SCALE /
NEIGHBOURHOOD SCALE
2 KM**

**ANGULAR BETWEENNESS
CITY SCALE
5 KM**

BUILDING TYPE

CASE STUDY ANALYSIS: ANGULAR BETWEENNESS

The data presented in the case study analysis relating to angular betweenness was based on the existing situation that did not consider the new developments and changes in street structure at Masthuggskajen. The diagrams to the left illustrates updated angular betweenness at neighbourhood and city scale based on the new development plans. Masthamnsgatan is predicted to continue to be a background street in the neighbourhood that has low centrality.

Therefore, it is important to create places to stay so that the street itself does not become a service street. This is especially important when you see that only one side of the street is active, while the other is blank.

—	1	LOW
—	2	
—	3	↓
—	4	
—	5	HIGH

CASE STUDY ANALYSIS: BUILDING TYPE

The figure is based on Berghauser Pont et al. 2019 and shows the built density profile of the area. Both Långgatorna and Masthuggskajen consists mostly of the dense mid-rise type buildings, which means that there in general will be many people present in the area. There is therefore potential for the streets and outdoor areas to be in use by the people living there and co-presence.

The two figures combined show that overall the area has high numbers of people, but within the area the more central streets are expected to have more pedestrians than the less central streets.

▢	SPACIOUS LOW-RISE
▢	COMPACT LOW-RISE
▢	DENSE LOW-ROSE
▢	SPACIOUS MID-RISE
▢	COMPACT MID-RISE
▢	DENSE MID-RISE

CASE STUDIES

Three different buildings have been chosen for the analysis using the principles. The building itself, the street and the neighbourhood will be considered in the analysis and is outlined below. Analysis of building A and B will be combined for the analysis except for ordered visual complexity, as they have similar characteristics, and share the same street and neighbourhood, but very different visual appearances.
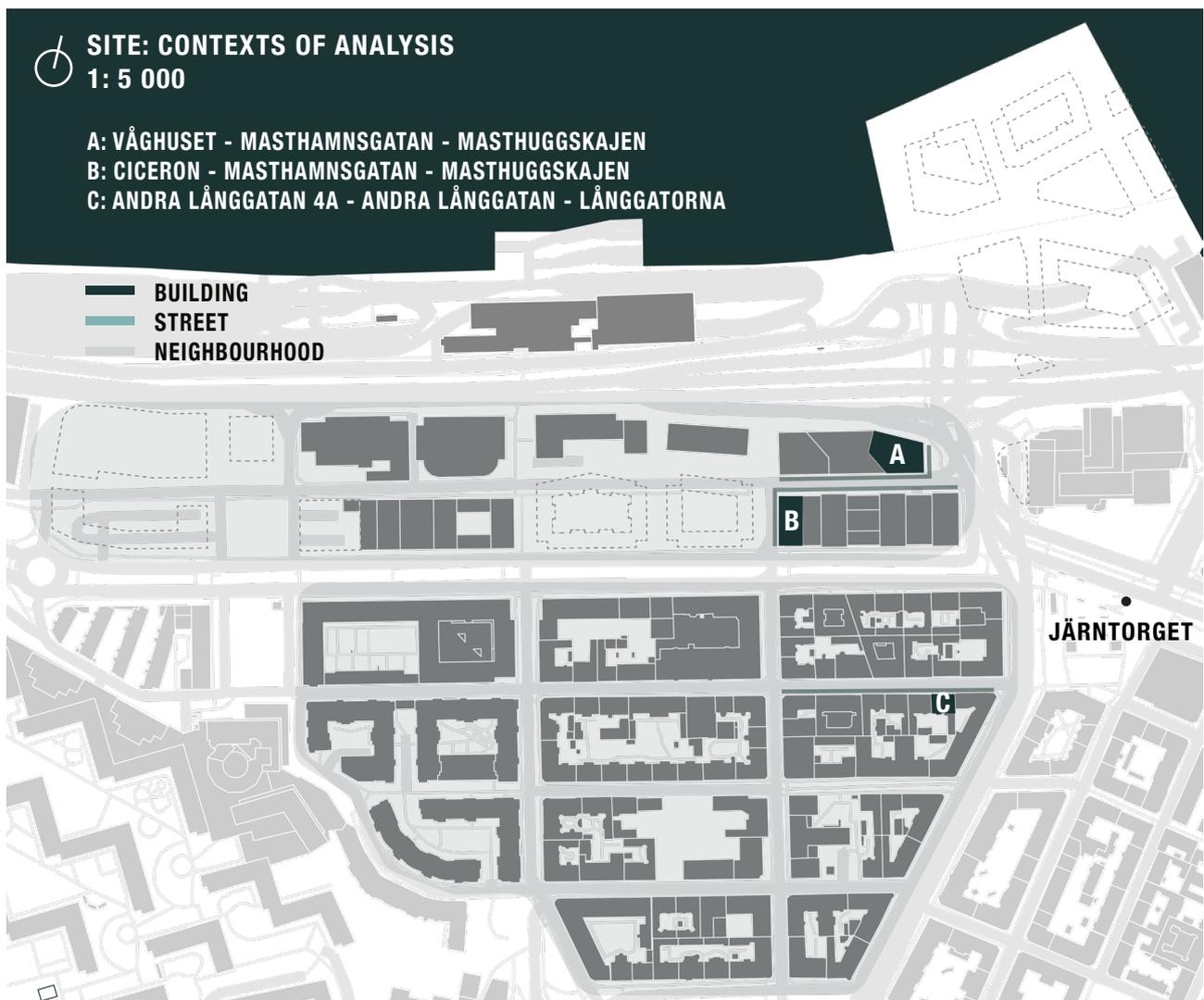
CASE STUDY A: VÅGHUSET

The first building is Våghuset which is a recently completed part of the new development of Masthuggskajen. It is visually exposed from especially Järntorget. The building houses offices and a cafe on the ground floor. It has a curved facade with horisontal glazing. It is located on the corner of a background street.

CASE STUDY B: CICERON

The second building is Ciceron, which is also a part of the new development. Ciceron is an apartment building with common areas on the ground floor. It is visually exposed along Första Långgatan which is a city street, as well as from Andra Långgatan. The building facade is modern, but with traditional elements. It is located on the corner of a background street.

CASE STUDY C: ANDRA LÅNGGATAN 4A

The third building is Andra Långgatan 4A, which is part of the traditional Långgatorna area. The building has a shop on the ground floor and flats on the upper floor. Its facade follows the characteristics of the area with traditional elements. The building is located along a neighbourhood street.

SITE: CONTEXTS OF ANALYSIS
1: 5 000

A: VÅGHUSET - MASTHAMNSGATAN - MASTHUGGSKAJEN
B: CICERON - MASTHAMNSGATAN - MASTHUGGSKAJEN
C: ANDRA LÅNGGATAN 4A - ANDRA LÅNGGATAN - LÅNGGATORNA

BUILDING
STREET
NEIGHBOURHOOD

A
B
C

JÄRNTORGET

1. ORDERED VISUAL COMPLEXITY

CASE STUDY A: VÅGHUSET

NEIGHBOURHOOD SCALE

ORDER |———————|——| CHAOS
COMPLEXITY |———————|——| MONOTONY

STREET SCALE

ORDER |——————|——| CHAOS
COMPLEXITY |—————|———| MONOTONY

BUILDING EDGE SCALE

ORDER |————|———| CHAOS
COMPLEXITY |———————|——| MONOTONY

- ● ORDER
- ● CHAOS
- ● COMPLEXITY
- ● MONOTONY

NEIGHBOURHOOD SCALE

●	**PLOT GRAIN:**	Large plots decrease the visual variety
● ●	**BUILDING SHAPE AND SIZE:**	Inconsistent building volumes with distinct building shapes
●	**ROOFSCAPE:**	Not articulated roofs
●	**CHARACTERISTICS OF THE AREA:**	Low mix of different styles and no specific area identity

STREET SCALE

●	**SHAPE & SIZE:**	Building volumes the size of full blocks
●	**COHERENCE:**	Connected buildings helps visual coherence
● ●	**MATERIALITY:**	Varying materiality, but no clear pattern
●	**VERTICAL FACADE ARTICULATION:**	Some vertical articulation, but mostly horisontal
● ●	**HIERARCHY:**	Little definition of bottom-middle-top
● ●	**COLOUR SCHEME:**	No coordinated colour scheme
●	**THREE-DIMENSIONAL FACADES**	Flat facades create monotony

BUILDING EDGE SCALE

|		
●	**BUILDING VOLUME:**	Distinct building shape and large volume
● ●	**HIERARCHY:**	Distinct ground floor, but no middle-top definition
●	**DISTRIBUTION OF FACADE ELEMENTS:**	No articulated facade elements other than the continuous horisontal windows
●	**VARIATION OF DETAILS:**	No variation in details
●	**THREE-DIMENSIONAL FACADE ELEMENTS**	Flat facade elements
● ●	**MAIN ENTRANCE**	Main entrance not distinguishable
●	**CONSTRUCTION OR FUNCTIONAL DETAILS**	No visible construction or other functional details
● ●	**MATERIAL TEXTURE & ARRANGEMENT**	Shiny and flat materiality with plastic and glass plates in a simple arrangement
●	**COLOR**	Only colour is black
●	**ORNAMENTATION**	No ornamentation
●	**CHARACTER**	No distinct character
● ●	**ACCENTUATED GROUND FLOOR**	Ground floor does not have distinct detail
●	**HOW THE BUILDING MEETS THE GROUND**	The building does not have any further visual boundaries

CASE STUDY B: CICERON

NEIGHBOURHOOD SCALE
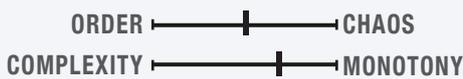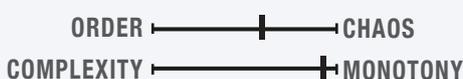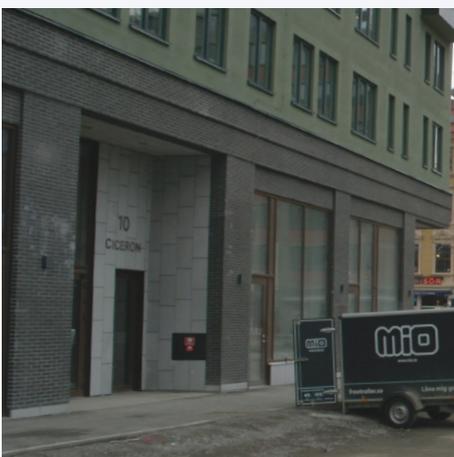
ORDER |——————|————— CHAOS
COMPLEXITY |—————————|—— MONOTONY

STREET SCALE

ORDER |———————|——— CHAOS
COMPLEXITY |—————————|— MONOTONY

BUILDING EDGE SCALE

ORDER |————————|—— CHAOS
COMPLEXITY |—————————|—— MONOTONY

- ● ORDER
- ● CHAOS
- ● COMPLEXITY
- ● MONOTONY

NEIGHBOURHOOD SCALE

PLOT GRAIN: Large plots decrease the visual variety

BUILDING SHAPE AND SIZE: Inconsistent building volumes with distinct building shapes

ROOFSCAPE: Some articulated roofs

CHARACTERISTICS OF THE AREA: Low mix of different styles and no specific area identity

STREET SCALE

SHAPE & SIZE: Building volumes the size of full blocks

COHERENCE: Connected buildings helps visual coherence

MATERIALITY: Varying materiality, but some coherence

VERTICAL FACADE ARTICULATION: Some vertical articulation, but not much

HIERARCHY: Some bottom-middle top definition

COLOUR SCHEME: Some coordinated colours

THREE-DIMENSIONAL FACADES Some articulation with window details

BUILDING EDGE SCALE

BUILDING VOLUME: Building volume attached to existing building, but significantly taller

HIERARCHY: Some bottom-middle-top definition with distinct ground floor and some distinction of roof

DISTRIBUTION OF FACADE ELEMENTS: Little and vague pattern in window and balcony placement in relation to the density of elements

VARIATION OF DETAILS: Some variation in window size, but no vertical or detail variation

THREE-DIMENSIONAL FACADE ELEMENTS Flat facade, but some three-dimensionality due to the balconies

MAIN ENTRANCE Clear main entrance

CONSTRUCTION OR FUNCTIONAL DETAILS No visible construction or other functional details

MATERIAL TEXTURE & ARRANGEMENT Material arrangement creates some contrast and hierarchy

COLOR Main colour contrasts the surrondings

ORNAMENTATION No ornamentation or other details

CHARACTER No distinct character

ACCENTUATED GROUND FLOOR More detailed design on ground floor level

HOW THE BUILDING MEETS THE GROUND There is some accentuation where the building meets the ground, but not much

CASE STUDY C: ANDRA LÅNGGATAN 4

NEIGHBOURHOOD SCALE

| ORDER | ⊢━━━━━━━━━━━━━ | CHAOS |
| COMPLEXITY | ⊢━━━━━━━━━━━━━ | MONOTONY |

STREET SCALE

| ORDER | ⊢━━━━━━━━━━━━━ | CHAOS |
| COMPLEXITY | ⊢━━━━━━━━━━━━━ | MONOTONY |

BUILDING EDGE SCALE

| ORDER | ⊢━━━━━━━━━━━━━ | CHAOS |
| COMPLEXITY | ⊢━━━━━━━━━━━━━ | MONOTONY |

- ● ORDER
- ● CHAOS
- ● COMPLEXITY
- ● MONOTONY

TOWARDS A HUMAN CITY

NEIGHBOURHOOD SCALE

- **PLOT GRAIN:** Fine plot grain and visual variety
- **BUILDING SHAPE AND SIZE:** Building volumes follow street shape
- **ROOFSCAPE:** Roof windows breaking up the red pitched roof characteristic in the area. More articulated roofs and facade details where they are more visible from a distance
- **CHARACTERISTICS OF THE AREA:** Clear area identity with brick facades, symmetrical window placement, vertical articulation, varied roofscapes, chamfered corners and corner balconies, clear hierarchy of bottom-middle-top.

STREET SCALE

- **SHAPE & SIZE:** Similar scale in building volumes
- **COHERENCE:** Connected buildings helps visual coherence
- **MATERIALITY:** Consistency in brick materiality
- **VERTICAL FACADE ARTICULATION:** Vertical articulation of facades
- **HIERARCHY:** Clear bottom-middle-top hierarchy
- **COLOUR SCHEME:** Coordinated colour scheme with pops of colour on windows, roofs and doors
- **THREE-DIMENSIONAL FACADES** Three-dimensionality created by facade elements and their details

BUILDING EDGE SCALE

- **BUILDING VOLUME:** Building connects on two edges to other buildings and follows street volume
- **HIERARCHY:** Hierarchy of bottom-middle-top
- **DISTRIBUTION OF FACADE ELEMENTS:** Symmetrical distribution of facade elements
- **VARIATION OF DETAILS:** Vertical variation and different levels of detail on facade elements like windows
- **THREE-DIMENSIONAL FACADE ELEMENTS** Some three-dimensional facade details and ornamentation
- **MAIN ENTRANCE** Clear main entrance accentuated with colour
- **CONSTRUCTION OR FUNCTIONAL DETAILS** Construction details (reinforcement over openings) creating complexity
- **MATERIAL TEXTURE & ARRANGEMENT** Use of materiality to create complexity through arrangement
- **COLOR** Pattern and bright colour add complexity
- **ORNAMENTATION** Some ornamentation on the upper floor
- **CHARACTER** Traditional character and visible wear
- **ACCENTUATED GROUND FLOOR** More detailed design on ground floor
- **HOW THE BUILDING MEETS THE GROUND** There is some accentuation where the building meets the ground

ORDERED VISUAL COMPLEXITY IN THE AREA

EXAMPLE OF CONSISTENCY OF ORDERED VISUAL COMPLEXITY ACROSS SCALES

Most exagerrated facade articulation in views that are visible from a distance.

Consistency of specific patterns and area characteristics along the street with variation.

The buildings have indivisual variation with ordered facade elements and complexity added through detail such as patterns within materiality and pops of colour.

EXAMPLES OF ADDING ORDERED VISUAL COMPLEXITY AT THE BUILDING EDGE SCALE

Continuing facade lines across buildings contribute to order.

Vertical variation in window details with most articulation on the lowest floor as that is experienced from the shortest distance.

Most visible parts of the buildings are the most articulated, especially roofscape.

Full block building, but vertical articulation and division creates complexity.

More complexity with a brick pattern on the ground floor.

More material complexity, detail and activity on the ground floor.

EXAMPLE OF LACKING CONSISTENCY OF ORDERED VISUAL COMPLEXITY ACROSS SCALES

The distinct building shapes create complexity from a distance, but lacks order since there are no patterns.

The flat and shiny facade provides little visual stimulation from the side from Järntorget.

The shape adds complexity from a distance, but there is little complexity up close.

EXAMPLES OF LACKING ORDERED VISUAL COMPLEXITY AT THE BUILDING EDGE SCALE

One building fills a full block, but is divided into segments which adds complexity from the street distance. The repetition of facade elements feels monotone from the building edge scale.
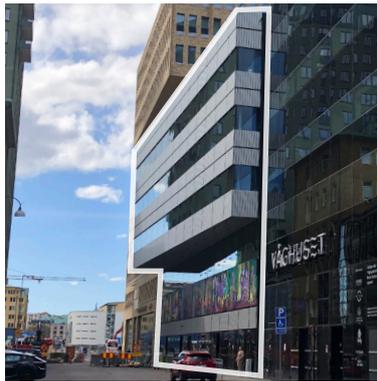
No functional or ornamental details creates a lack of complexity.

Little functional or ornamental detail and lack of texture or complexity by materiality.

Lack of detail and flat materiality.

No variation of detail in the window elements

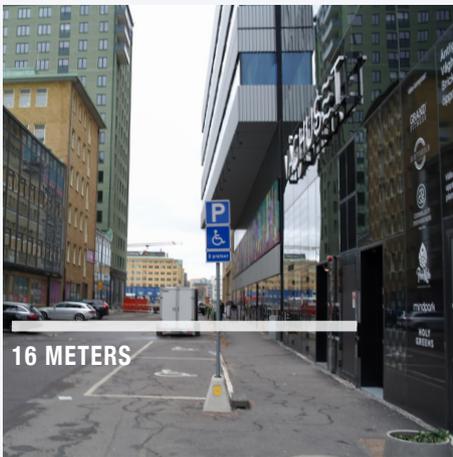

Lack of order in the arrangement of facade elements.

2. VISUAL EXPOSURE TO PEOPLE

JÄRNTORGET

THROUGH MOVEMENT

JÄRNTORGET IS A LOCAL TRANSPORT HUB WHERE PEOPLE PASS THROUGH

CASE STUDY A & B

16 METERS

STREET WIDTH ALLOWS FOR READING FACIAL EXPRESSIONS

CASE STUDY C

INSIDE ⟷ OUTSIDE
11 METERS   **1.5 METERS**

STREET WIDTH ALLOWS FOR READING FACIAL EXPRESSIONS, SIDEWALKS DEFINE SPACES FOR CONVERSATION AND THERE ARE VISUAL CONNECTIONS BETWEEN THE INSIDE AND OUTSIDE OF BUILDINGS.

✓ FULFILLED   ✗ SOME
✗ NOT FULFILLED   ✓ FULFILLMENT

CASE STUDY A & B: VÅGHUSET & CICERON

Case study A and B have similar conditions and the results are therefore presented together.

✓ **INVITE AT NEIGHBOUR-HOOD SCALE (MAX 100 M):** — Public spaces in the neighbourhood have a smaller radius than 100 meters (Järntorget). Since it is a transport location, it has intensity through movement of people, and some people staying along the edges of the surrounding buildings during warmer seasons.

✓ **CONNECT AT STREET SCALE (MAX 25 M):** — Street width around 16 meters which makes it possible to read emotions of people on the other side of the street, but does not necessarily create intensity since the street is a background street. There are plans for the street to become a pedestrian street which creates opportunities for intensity.

✗ **MEET AT BUILDING EDGE SCALE (MAX 3 M)** — No clear defined spaces of conversation or designated sidewalks.

✗✓ **CONNECT INSIDE AND OUTSIDE** — Some visual connection between the inside and outside on the ground floor on one side of the street.

✓ **FRAME, NOT DISRUPT VIEWS** — No visual disruptions.

CASE STUDY C: ANDRA LÅNGGATAN 4

✓ **INVITE AT NEIGHBOUR-HOOD SCALE (MAX 100 M):** — Järntorget is the only larger public open area for this neighbourhood too.

✓ **CONNECT AT STREET SCALE (MAX 25 M):** — The street width is around 11 meters which allows people to read emotions across the street. The street is a neighbourhood street and will have through movement which contributes to intensity at this street width.

✓ **MEET AT BUILDING EDGE SCALE (MAX 3 M)** — Width of sidewalks is less than 3 meters which allows for easy conversation while walking along, as well as intensity of people. Few other defined spaces for conversation are provided. There are some spaces along the street relating to restaurants that provide seating for staying.

✓ **CONNECT INSIDE AND OUTSIDE** — There are several clear visual connections between the inside and outside on the ground floor with distances of less than 3 meters.

✗✓ **FRAME, NOT DISRUPT VIEWS** — The main visual obstacle on the streets are parked cars which hinder views between sidewalks.

3. SUPPORT SOCIAL STRUCTURES

MASTHUGGSKAJEN HAS LARGE PLOT GRAIN WHICH LEADS TO LESS VARIETY IN FUNCTION AND VISUAL EXPRESSION ALONG THE STREET

THERE IS A CLEAR DIFFERENCE IN TYPO-LOGY BETWEEN THE TWO NEIGHBOURHOODS

LÅNGGATORNA HAS FINER PLOT GRAIN AND THEREFORE MORE VISUAL AND FUNCTIONAL VARIETY

√ FULFILLED   ✗ SOME
✗ NOT FULFILLED   ✗/√ FULFILLMENT

## CASE STUDY A & B: VÅGHUSET & CICERON

Case study A and B have similar conditions and the results are therefore presented together.

✗ **FINER PLOT GRAIN:** Large plot grain with some variation in function with offices, flats and some cafes.

✗/√ **"SHORT" ROUTES:** Short routes between some points of interest, but traffic veins surrounding the street act as obstacles.

√ **PUBLIC PLACES TO STAY:** A public place is planned at the end of the street, but right now, there are no public spaces other than Järntorget.

√ **PRIORITIZE PEDESTRIANS:** The street will be a pedestrian street which favours people in the area over cars.

✗/√ **PROVIDE ACTIVITIES:** Commercial activities are provided by outdoor seating in a cafe. Some activities might be provided in the future plans of the street.

✗ **FACING BUILDINGS:** Building fronts are not facing other.

CASE STUDY C: ANDRA LÅNGGATAN 4

√ **FINER PLOT GRAIN:** Fine plot grain which enhances the variation in function, social structure and contributes to visual variation.

√ **"SHORT" ROUTES:** Short routes with high integration and betweenness, few physical obstacles (mostly roadwork).

√ **PUBLIC PLACES TO STAY:** Some smaller public spaces are provided relating to bars and restaurants, but none which are not related to a commercial activity.

√ **PRIORITIZE PEDESTRIANS:** Pedestrians are prioritised through slow traffic, and sidewalks are provided along all streets for safe walking.

✗/√ **PROVIDE ACTIVITIES:** Commercial activities are provided such as outdoor seating in restaurants and bars, but again only relating to commercial activity.

√ **FACING BUILDINGS:** Building fronts are facing each other along the street.

4. CREATE GOOD EDGE CONDITIONS
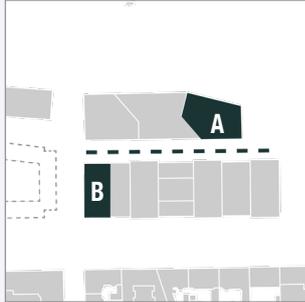
CLEAR STREET CORRIDOR, BUT DOES NOT APPLY TO THE WHOLE AREA
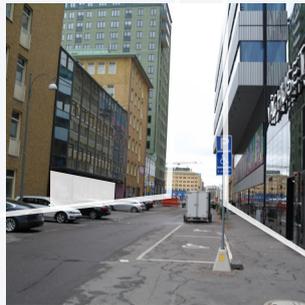
CONTINUOUS EDGES WITH BLIND UNITS AND NO VIEW

VISUAL CONNECTION BETWEEN INSIDE AND OUTSIDE, BUT NO TRANSITION

NO PLACES TO STAY AND NO PLACE TO SIT AND NOTHING TO DO

✓ FULFILLED   ✗ SOME
✗ NOT FULFILLED   ✗/✓ FULFILLMENT

CASE STUDY A & B: VÅGHUSET & CICERON

Case study A and B have similar conditions and the results are therefore presented together.

DEFINE EDGES AT NEIGHBOURHOOD AND STREET SCALE

✗/✓ **STREET CORRIDORS**   Some clear street corridors, but large distances between some of the buildings. Some streets will have views to the sea, but there are not views for all streets.

✗/✓ **CONTINUOUS EDGES**   Continuity of walls along the street, but there are blind units along most of one side of the street.

✗ **HIERARCHY OF EDGES**   No places to stay along the street.

BUILDING EDGES SHOULD CONNECT THE INSIDE AND OUTSIDE OF BUILDINGS THROUGH A VISUAL CONNECTION AND TRANSITION OF PUBLIC TO PRIVATE

✓ **OPEN UP**   Visual connection between the inside and the outside on the ground floor.

✗/✓ **TRANSITION OF PRIVACY**   No transition or marking of the main entrance for building A, but a marked entrance and transition for building B. There is a place to stay outside the building, but it does not have any defined spaces for sitting or staying.

EDGES SHOULD PROVIDE PLACES TO STAY THAT PROVIDE REFUGE AND INVITES LONGER STAYS

✗ **PROTECTED PLACE TO STAY**   No defined places to stay along the facade.

✗ **VIEWS**   There is a view towards the sea and Järntorget, but it is obstructed by roads.

✗ **SEATING FOR DIFFERENT INTENSITIES**   No outdoor seating.
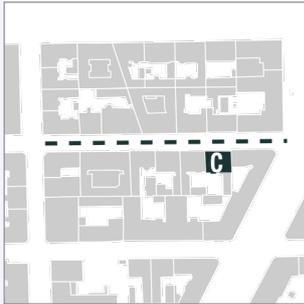
✗ **PROVIDE AN ACTIVITY**   No activity.

4. CREATE GOOD EDGE CONDITIONS

CLEAR STREET CORRIDORS ALONG MOST OF THE AREA

CONTINUOUS EDGES AND VIEW AT THE END OF THE STREET

CLEAR ENTRANCE AND A MARKED TRANSITION TO THE INSIDE

NO PROTECTED SPACE ALONG THE FACADE, BUT A CONNECTION TO THE INSIDE

✓ FULFILLED   ✗ SOME
✗ NOT FULFILLED   ✗/✓ FULFILLMENT

CASE STUDY C: ANDRA LÅNGGATAN 4

Case study A and B have similar conditions and the results are therefore presented together.

DEFINE EDGES AT NEIGHBOURHOOD AND STREET SCALE

✓	**STREET CORRIDORS**	Mostly clear street corridors, mostly interesting views, but some streets do not provide views at the end.
✓	**CONTINUOUS EDGES**	Continuous edges mostly, few gaps, most gaps create public space, some passive units, space for people to move along.
✗/✓	**HIERARCHY OF EDGES**	Some variation in size in places to stay along the street, mostly relating to bars and restaurants.

BUILDING EDGES SHOULD CONNECT THE INSIDE AND OUTSIDE OF BUILDINGS THROUGH A VISUAL CONNECTION AND TRANSITION OF PUBLIC TO PRIVATE

✓	**OPEN UP**	Visual connection between the inside and outside.
✗/✓	**TRANSITION OF PRIVACY**	A little setback for the entrance, but otherwise no transition.

EDGES SHOULD PROVIDE PLACES TO STAY THAT PROVIDE REFUGE AND INVITES LONGER STAYS

✗/✓	**PROTECTED PLACE TO STAY**	Some protected space along the facade.
✗/✓	**VIEWS**	People watching along the street or in the opposing building.
✗/✓	**SEATING FOR DIFFERENT INTENSITIES**	Some outdoor seating.
✗/✓	**PROVIDE AN ACTIVITY**	People watching or visiting cafes and restaurants.

EXAMPLE OF GOOD EDGE CONDITIONS IN THE AREA

Somewhere to sit and watch people walk along.

Seating creating a transition between inside and outside.

Clear main entrance defined by size and detailed articulation.

Little nook to stay with a bench and a plant.

A larger setback becomes a public space protected from wind and rain.

Visual connection between the sidewalk and inside with low basement windows.

SUMMARY OF THE CASE STUDY ANALYSIS

Three case studies have been analysed according the four architectural principles for achieving designs that trigger positive emotional responses. The four principles are:
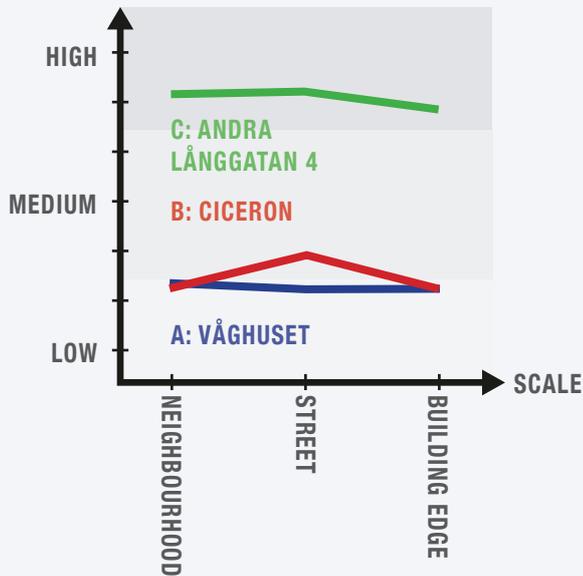
1.   ORDERED VISUAL COMPLEXITY
2.   EXPOSURE TO OTHER PEOPLE
3.   SUPPORT SOCIAL STRUCTURE
4.   CREATE GOOD EDGE CONDITIONS

The analysis highlights the strong and weak points for the different case studies when it comes to triggering positive emotional responses in people who experience the built environment. The weaknesses that are discovered will be further developed in a design exercise.

Following is a summary of the case study analysis in terms of points of improvement that should be considered for the design exercise.

PRINCIPLE 1:
ORDERED VISUAL COMPLEXITY

**DEGREE OF ORDERED
VISUAL COMPLEXITY**

HIGH

**C: ANDRA
LÅNGGATAN 4**

MEDIUM

B: CICERON

LOW

A: VÅGHUSET

SCALE

NEIGHBOURHOOD — STREET — BUILDING EDGE

PRINCIPLE 2:
VISUAL EXPOSURE TO OTHER PEOPLE

CASE STUDY	A & B	C
INVITE AT NEIGHBOURHOOD SCALE:	✓	✓
CONNECT AT STREET SCALE:	✓	✓
MEET AT BUILDING EDGE SCALE:	✗	✓
CONNECT INSIDE AND OUTSIDE:	✗/✓	✓
FRAME, NOT DISRUPT VIEWS:	✓	✗/✓

PRINCIPLE 3:
SUPPORT SOCIAL STRUCTURE

CASE STUDY	A & B	C
FINER PLOT GRAIN:	✗	✓
"SHORT" ROUTES:	✗/✓	✓
PUBLIC PLACES TO STAY:	✓	✓
PRIORITIZE PEDESTRIANS:	✓	✓
PROVIDE ACTIVITIES:	✗/✓	✗/✓
FACING BUILDINGS:	✗	✓

PRINCIPLE 4:
CREATE GOOD EDGE CONDITIONS

CASE STUDY	A & B	C
STREET CORRIDORS	✗/✓	✓
CONTINUOUS EDGES	✗/✓	✓
HIERARCHY OF EDGES	✗	✗/✓
OPEN UP	✓	✓
TRANSITION OF PRIVACY	✗/✓	✗/✓
PROTECTED PLACE TO STAY	✗	✗/✓
VIEWS	✗	✗/✓
SEATING FOR DIFFERENT INTENSITIES	✗	✗/✓
PROVIDE AN ACTIVITY	✗	✗/✓

TOWARDS A HUMAN CITY

REFLECTION ON POINTS OF IMPROVEMENT

The diagram to the left illustrates the consistency of the ordered visual complexity of the three case studies across scales. The ordered visual complexity is shown as the average of the order and complexity. The ordered visual complexity is higher and more consistent in Långgatorna. There is more emphasis on places and views that are seen by more people and attention to detail in spaces that are experienced up close. There is less ordered visual complexity consistency in Masthuggskajen. Most of the ordered visual complexity comes from the building shapes, but zooming in, there is not much facade articulation that contributes to the ordered visual complexity. The difference in building sizes and the time span of evolution can have contributed to the different results.

The case studies have similar conditions when it comes to being able to perceive other people meaningfully in the space, but there is more intensity in Långgatorna due to its higher street centrality and potential for more people present. The scale for meeting people at the building edge scale is not facilitated in Masthuggskajen, as well as connecting inside and outside physically and visually.

The plot grain in Masthuggskajen is large and in Långgatorna it is finer, which affects the variation of function and visual expressions. Masthuggskajen therefore has to make up for this in other ways. Another issue is that the building fronts are not facing each other in Masthuggskajen, which blocks social interaction across buildings, and one side of the street therefore must support the social structure of the full street. There is also a lack of activities provided in Masthuggskajen.

There are street corridors in both contexts, but the blind edge along the whole street in Masthuggskajen disrupts continuity. Better transitions between inside and outside should also be facilitated. There is a lack of good staying conditions, which is especially important in Masthuggskajen and along Masthamnsgatan since this is a background street and it and will therefore have opportunities for more space used for staying than movement. In Långgatorna, the area has more movement, and good conditions for walking along, as well as a few areas with good staying conditions.

CHAPTER 6: DESIGN IMPLEMENTATION

DESIGN PROCESS

The purpose of the design implementation is to apply the design principles into the design process and test how they can be used in an early design phase to help architects design buildings and urban settings which trigger positive emotional responses in people. The design project roots in the case study analysis and aims to integrate more of the principles.
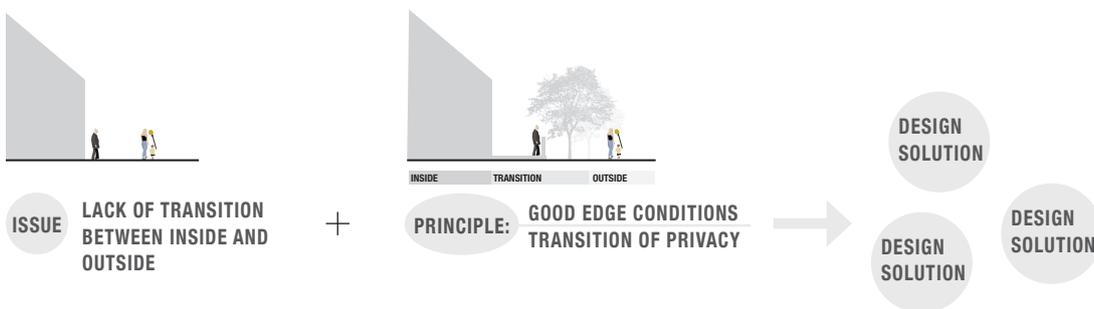
The design process will be applied to the existing setting of Masthuggskajen and the building Våghuset (**CASE STUDY A**). The design study will only include the exterior of the building, focusing on the facade and the street Masthamnsgatan, and will not change the plan or general volume of the building or street configuration. The main focus of the design exercise will be the issues uncovered in the case study analysis and how to incorporate the design principles. Not every issue will be adressed, but several of the principles will be covered to illustrate their use.

ISSUE + PRINCIPLE = NEW DESIGN SOLUTION

The issues that are adressed in the design exercise will be responded to with a principle to create a design solution that is more likely to trigger positive emotional responses in people. Each part of the design exercise therefore presents the issue and a principle that tackles the issue.
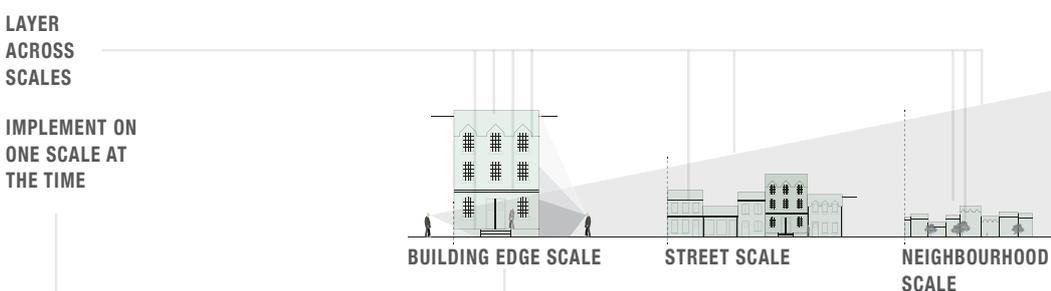
ISSUE LACK OF TRANSITION BETWEEN INSIDE AND OUTSIDE + **PRINCIPLE:** GOOD EDGE CONDITIONS TRANSITION OF PRIVACY → DESIGN SOLUTION DESIGN SOLUTION DESIGN SOLUTION

TWO WAYS OF APPLICATION

The principles are applied in two ways. **PRINCIPLE 2 - 4** are more easily implemented in a design process if you know them because the more specific measures apply to one scale, such as the implementation of an activity or protected edges. These are implemented at one scale. **PRINCIPLE 1,** ordered visual complexity is comparably more complex to achieve as it needs to be layered in a consistent way across scales and fit into the surrounding context, which is reflected in the way that the case study analysis has been presented. This principle needs to be added in layers.

LAYER ACROSS SCALES

IMPLEMENT ON ONE SCALE AT THE TIME

BUILDING EDGE SCALE   STREET SCALE   NEIGHBOURHOOD SCALE

REFLECTIONS FROM THE CASE STUDY ANALYSIS

During the case study analysis, some reflections were made about how the design process might have influenced the outcome of the analysed contexts' fulfilment of the principles, and therefore the degree to which they trigger positive emotional responses in people. The following reflections were implemented into the design process to better achieve the principles proposed to trigger positive emotional responses in people.

DESIGN IN DIFFERENT SCALES

Based on the analysis, the ordered visual complexity of the new buildings are not consistent across scales. The design process will therefore focus on designing in different scales, as this might improve the cohesiveness of the ordered visual complexity.

DESIGN WITHIN THE CONTEXT

Instead of designing the building in isolation, the design exercise will look at designing buildings within the context of its surroundings. The current buildings stand out from their surroundings, and looking at the design in context might help to connect them visually to their context.

SKETCH SPECIFIC VIEWS AND SCALES FIRST, DO NOT START WITH ELEVATIONS AS THAT IS NOT WHAT YOU EXPERIENCE

Sketching might help to break away from the limitations that designing using computer software may have. Therefore the design process will focus on sketching from specific views rather than traditional elevations as that is what we will experience.

DESIGN ONE BUILDING WITHIN THE CONTEXT WITH FOCUS ON SPECIFIC VIEWS

Some views will be seen by more people and therefore impact more people, and the views identified as important will be used to ensure specific attention to these moments of the building.
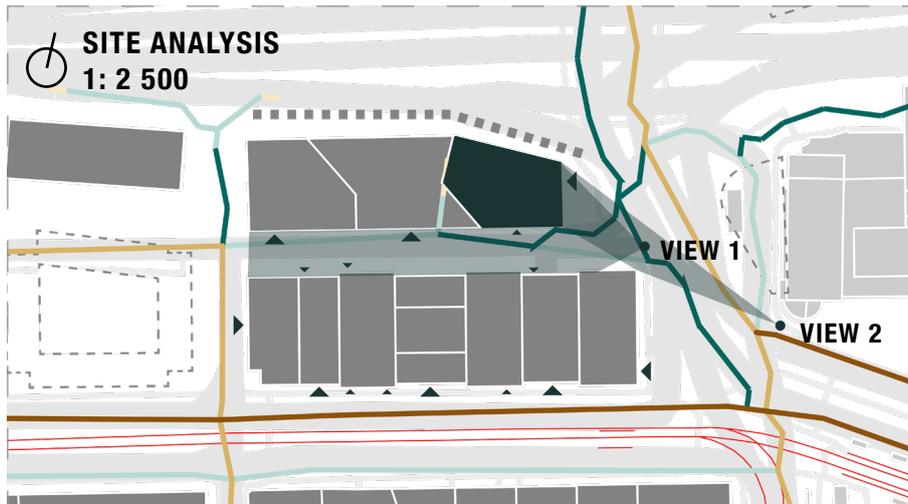
DESIGN MANY ITERATIONS

To achieve the wanted result that triggers positive emotional responses, many design iterations are needed.

DELIMITATIONS OF CASE STUDY ANALYSIS

The design exercise will focus on principles 1 and 4, but include some of the analysis and strategies of principles 2 and 3.

The design exercise will focus mostly on the building edge scale and the street scale due to the issues uncovered in the case study analysis and the scope not including changing the plans, general volumes and street configurations.

MAIN ISSUES FROM THE ANALYSIS OF CASE STUDY A

SITE ANALYSIS
1: 2 500

VIEW 1

VIEW 2

VÅGHUSET
MAIN ENTRANCE
ENTRANCE
IMPORTANT VIEWS
BOUNDARY CREATED
BY THE MAIN ROAD
TRAM LINES

CITY STREET
NEIGHBOURHOOD STREET
LOCAL STREET
BACKGROUND STREET

The results from the analysis informs the design exercise and the focus will be working to improve the main negative points. The following are the main points that can be improved.

LACK OF ORDERED VISUAL COMPLEXITY AND COHERENCE:

There is a lack of coherence of orderered visual complexity. There are two main views that are expected to be exposed to more people based in the centrality and the placement of the main entrance of the building. These views will be used for the design development at different scales. From view 1, the whole street is visible since the street is relatively short. View 2 is from the other side of the road towards Järntorget, and many people will experience this building from a similar viewpoint, and therefore it is important. This is the view that draws people in.

ONE SIDE OF THE STREET IS RESPONSIBLE FOR CREATING CONDITIONS THAT TRIGGER POSITIVE EMOTIONAL RESPONSES:

The buildings along Masthamnsgatan are not facing each other, and therefore one side of the street is responsible for creating good conditions and supporting the social structure. The buildings to the south also create large blind edges, which also affect the street negatively. The highway also blocks off the area from the north. These conditions lowers the chance of increasing integration and centrality of the street, which impacts the potential presence of people. Building A therefore needs to contribute to the street not becoming a service street and create conditions for staying.

LACK OF GOOD EDGES AND PLACES TO STAY THAT TRIGGER POSITIVE EMOTIONAL RESPONSES AND INCREASE THE PRESENCE OF PEOPLE:

The edges need to improve significantly. They need to become more continuous and offer places to stay of different sizes. There needs to be a clear transition zone between the inside and outside, especially marking the main entrance. Lastly, there is a lack of places to stay that offer prospect and refuge, especially since the surrounding tall buildings and narrow street will have little sun exposure.
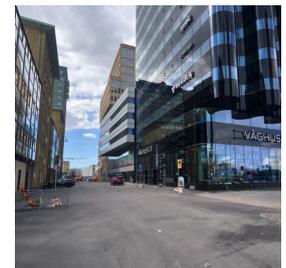
VIEW 1

VIEW 2

THERE IS A LACK OF ORDERED VISUAL COMPLEXITY

ONLY ONE SIDE OF THE STREET FACES THE STREET

**LACK OF GOOD EDGES WHERE PEOPLE CAN STAY**

77

ISSUE 1: LACK OF ORDERED VISUAL COMPLEXITY AND COHERENCE
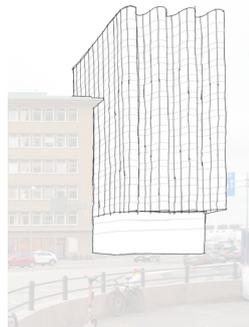
LACK OF ORDERED VISUAL COMPLEXITY AND COHERENCE

The building lacks complexity at all scales, but especially the street and building scale. The design process must add complexity in an ordered way at the different scales using different building elements. Below, you can see that the building, when abstracted has an interesting shape from this view, but that the details are mostly horisontal and relates to the shape. More detail is therefore needed within the facade elements than the shape itself.
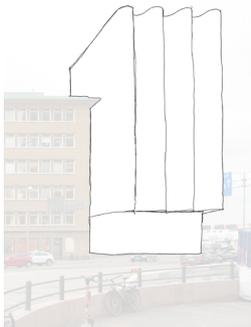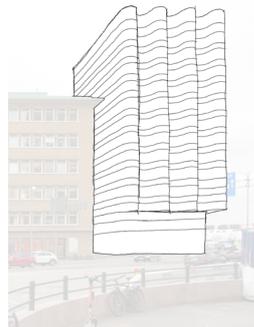
BUILDING SHAPE   **HORISONTAL LINES**   **VERTICAL LINES**   **ADDED WINDOWS**

## APPLYING PRINCIPLE 1: ORDERED VISUAL COMPLEXITY

BALANCING & LAYERING ORDER AND COMPLEXITY

To balance the ordered visual complexity, more complexity is layered through different building elements.

From this view at this scale, complexity is added through introducing brick as material, drawing from the surrounding buildings. Brick patterns and vertical articulation is also layered. The building volume is kept, but more threedimensionality and complexity is added to the street and building edge scale elements.
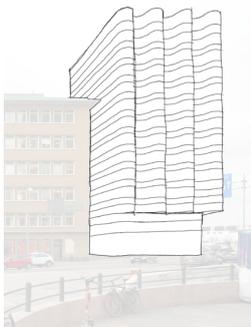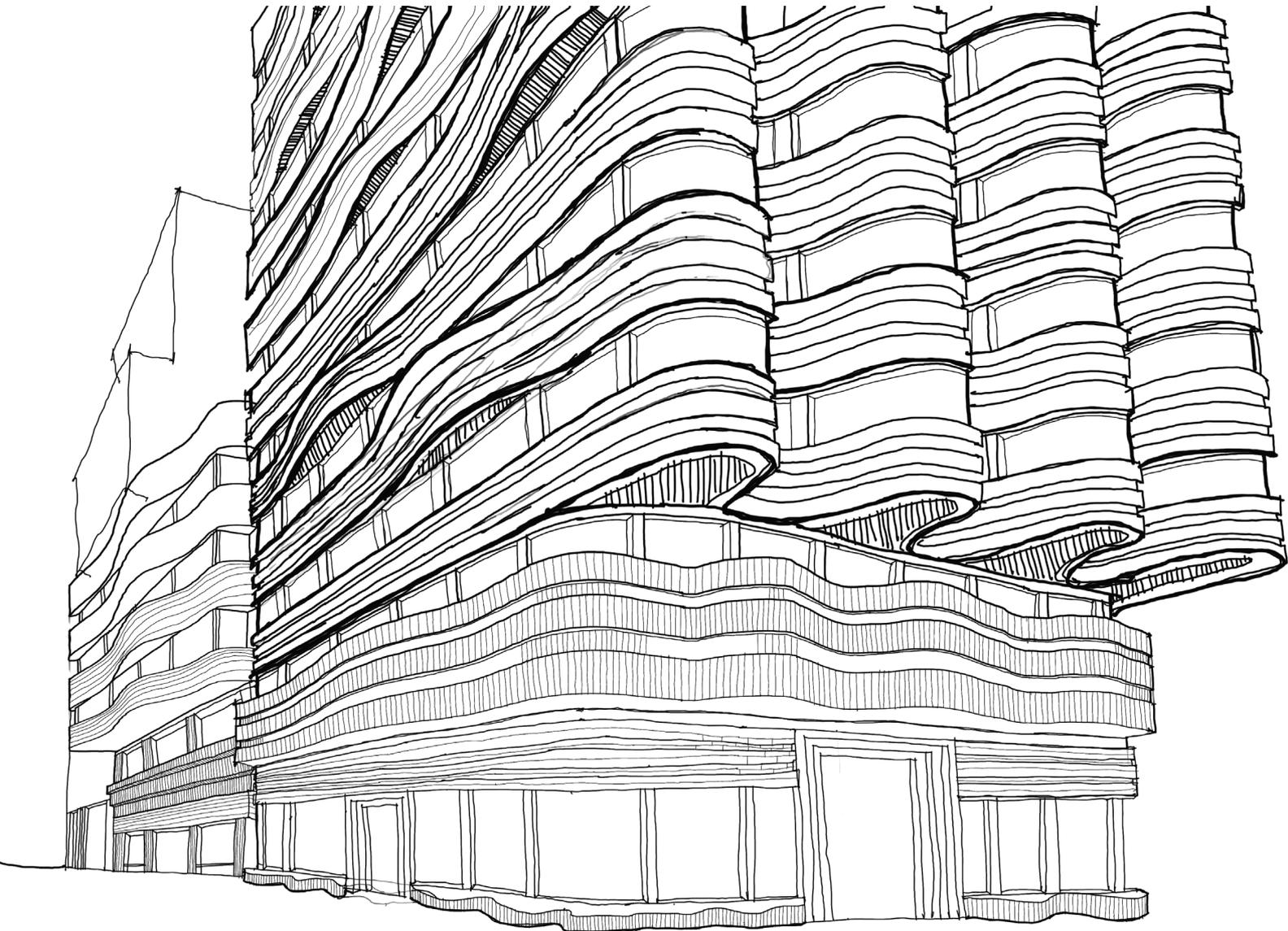
BUILDING SHAPE WITH HORISONTAL LINES
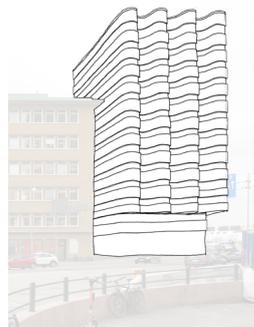
ADDING THREE-DIMENSIONALITY TO THE MATERIAL OF THE FACADE
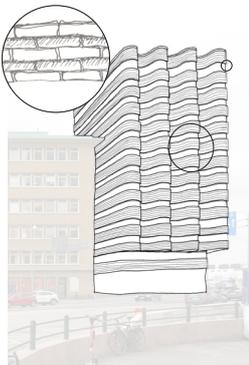
CREATING PATTERNS WITHIN THE FACADE WITH BRICK

ADDING A CLEAR MAIN ENTRANCE AND VERTICAL BRICK COLUMNS TO MARK WINDOWS

LAYERING ORDERED VISUAL COMPLEXITY BY CURVES

Another facade feature that was integrated to add complexity was curves. Curves were implemented into the facade wall facing the street, extruding small balconies. The curves continue the waves along the front facade, using an already implemented characteristic to create complexity. The curves are also integrated into the neighbouring building.

LAYERING ORDERED COMPLEXITY WHERE PEOPLE ARE CLOSE TO THE BUILDING

Adding complexity and detail where most people experience the building is important. The main entrance is something most people will experience from a short distance too. This building does not have an articulated main entrance at the moment, and this is something that can be developed. Highlighting the main entrance also works towards creating clear transitions between the inside and outside.

ISSUE 2: ONE-SIDED STREET & LACK OF GOOD EDGES

ONE SIDED STREET

Since one side of the street is blind (left), the responsibility of creating a social structure and triggering positive emotional responses lies with the other side (right).

LACK OF GOOD EDGES

There is a lack of spaces to stay along the street that offer prospect and refuge, as well as clear transitions between the inside of the building and the street.

**VIEW 2: CURRENT SITUATION**

APPLYING PRINCIPLE 4: GOOD EDGE CONDITIONS

The issues described relate to an existing setting, and it is therefore limited how many changes can be made according to principles 2 and 3. Therefore principle 4 will be used to work with the issues presented. Creating good edges can help extend the effects of the building itself onto the whole street, and work against the blind edges and the buildings turning away.

The issue will be worked with on the street level and the building edge level. The following strategies under principle 4 will be applied:
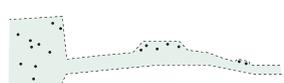
STREET SCALE

CONTINUOUS EDGES
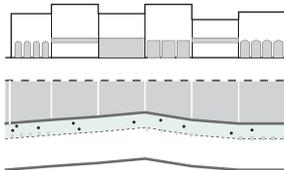
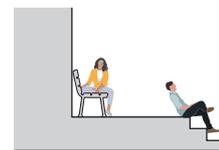**TRANSITION OF PRIVACY**

HIERARCHY OF SPACES

BUILDING EDGE SCALE

PROTECTED PLACE TO STAY
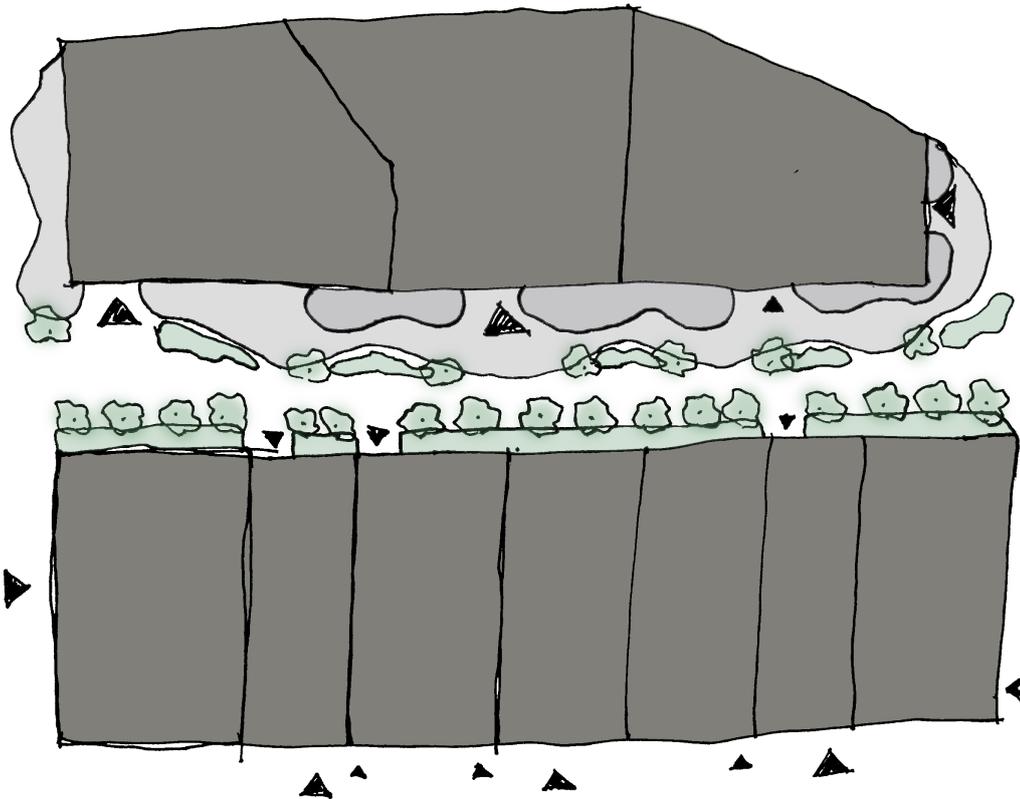

SEATING

VIEWS

PROVIDE AN ACTIVITY

INTEGRATING PLATFORMS ALONG THE STREET TO CREATE A CONTINUOUS EDGE AND PLACES TO STAY

STREET SCALE:
CREATING CONTINUOUS EDGES &
A HIERARCHY OF SPACES

On the street scale, it is important to facilitate places to stay along of different sizes and for the street to be continuous. By extending the building edge into the street, the lack of edges on the other side of the street are less significant.

Curved platforms that follow the forms of the building are added. They create different levels that marks transitions between inside and outside. The platforms create a continuous edge along the street that facilitates a hierarchy of spaces of different sizes. The street is also clearly divided into spaces for movement and spaces to stay along.

The trees provide natural views that trigger positive emotional responses, and can also provide protection from weather and wind corridors. The other side of the street could also facilitate plants or bushes growing.

BUILDING EDGE SCALE:
**SPACES TO STAY WITH SEATING, VIEWS AND SOMETHING TO DO**

On the building edge scale, spaces to stay along the street have to be created that are protected from weather, have nice views and give the person something to do. Creating primary seating such as benches and secondary seating such as lower edges provide places to stay for varying amounts of people.

The main benches along the facade of the building create the upper platform. It is a place for people to sit, covered by the curved balcony above. The lower platform can provide spaces for tables and chairs relating to the cafe on the ground floor, or an outdoor yoga platform for the yoga studio further down the street.

Views of greenery are created along the street, and the planned park at the end of the street will provide a view towards the end.

Something to do along this street could be to include boule lanes or permanent table tennis or communal gardening for the apartment building at the end of the street.

BALCONY PROTECTING
THE EDGE

CONNECTION TO INSIDE

PLACES TO SIT WITH
SOMETHING TO LOOK AT
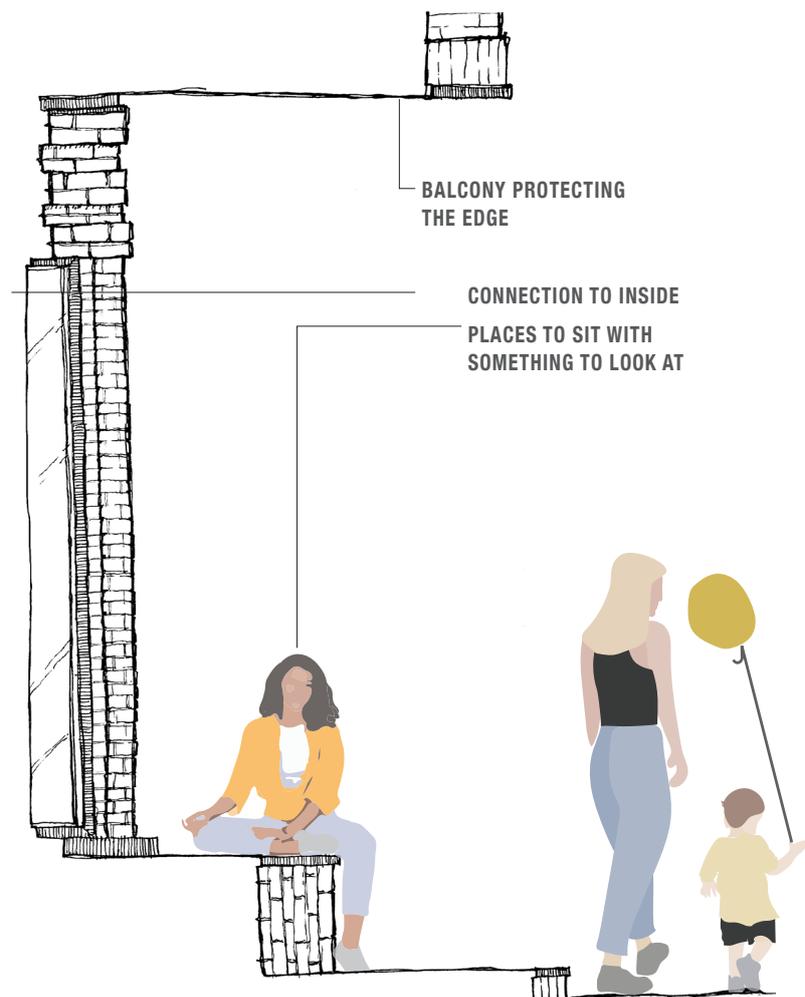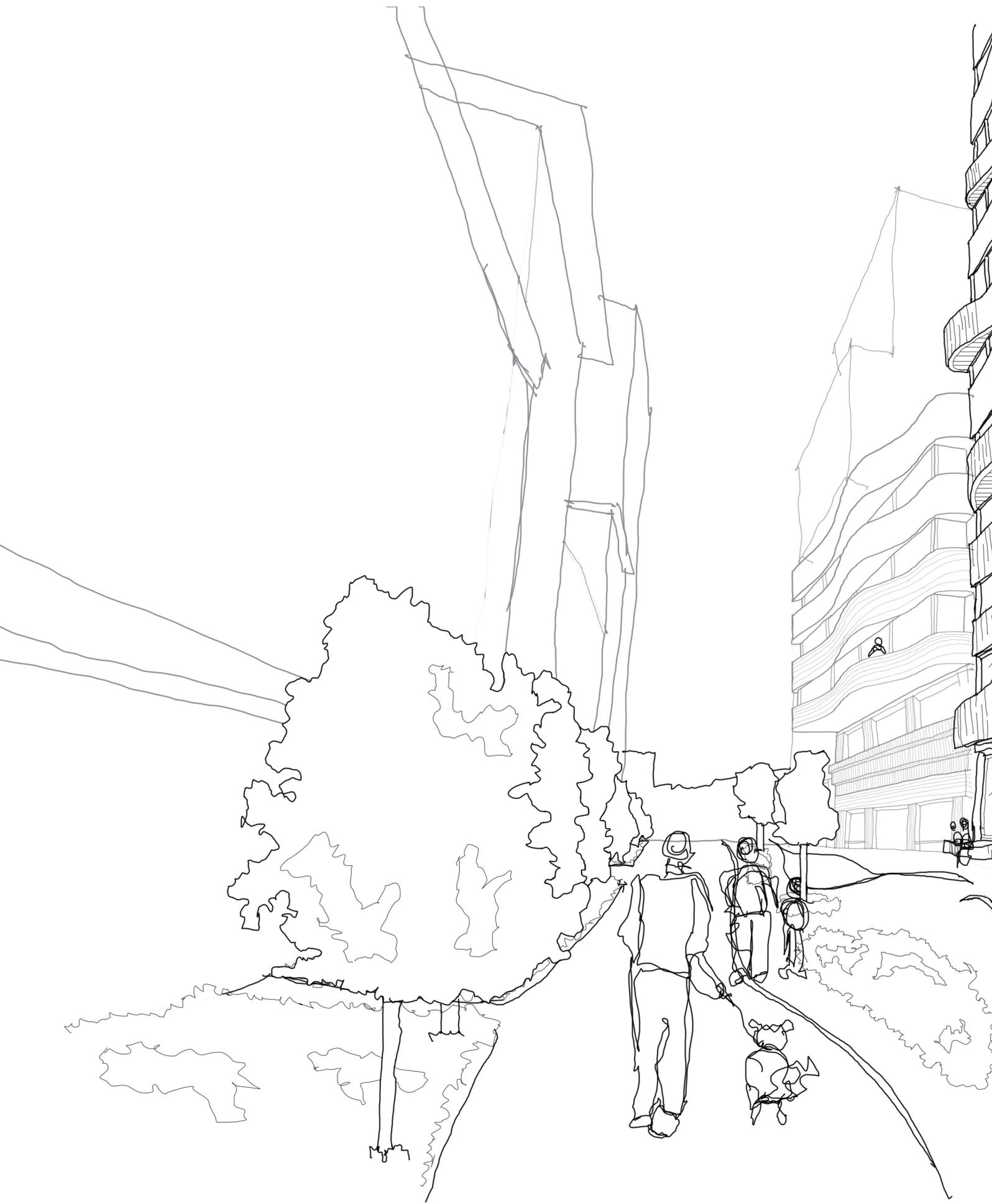
CHAPTER 7 : DISCUSSION

BRIEF SUMMARY

The thesis investigated the question: How can architects promote human wellbeing in a densifying and growing urban environment by designing urban architecture that triggers positive emotional responses in people?

Different theoretical approaches to the topic were explored to find principles and strategies that could contribute to triggering positive emotional responses in the urban environment. These principles were then synthesized and translated into specific spatial principles. The principles for creating positive emotional responses in people are the main contribution of the thesis. They were used to analyse a context in central Göteborg and further tested in a design study to increase the potential for triggering positive emotional responses.

INTERPRETATION

The principles offer spatial conditions that can guide architects towards creating designs that are based in the human perceptual system, create good edge conditions and can contribute to more human interaction in the urban environment. These aspects promote positive emotional responses in humans who experience the built environment.

The guidelines can be useful for architects and designers working in the urban realm, as well as planners or clients interested in creating urban spaces that promote wellbeing.

The results do not favour a specific architectural style, but all the principles are based on the human scale, perception and behaviour. The theory of affordances, based in behavioural psychology presses the importance of designing with the cognition of the perceiver in mind to create a specific response to the environment, which is here creating positive emotional responses (Gibson, 2015).

HOW DO THE PRINCIPLES WORK?

The principles create specific spatial conditions with clear illustrations based on different theoretical approaches and have the purpose of helping architects design urban architecture that triggers positive emotional responses. They can provide guidance towards design issues without creating a one-size-fits-all solution.

In the case study analysis, the principles highlighted obstacles that hinder the urban environments from triggering positive emotional responses in people. The principles made it easier to identify the specific spatial conditions that trigger negative emotional responses and thereby alter them.

In the design process, which was applied to an existing setting, the design principles guided the proposal through providing spatial relationships that trigger positive emotional responses. The different principles have different applications, and not all principles are relevant in all design contexts. They offer guidelines for the architect to follow, but the architect have to consider which principles are relevant and how to design for the context. The principles therefore enable several design solutions.

In this case, only two of the principles, principle 1 and 4, were actively applied since the existing context and design exercise was limited. Principle 2 and 3 are more easily applied in a planning context or larger design project as they consider the larger street or neighbourhood context and must be implemented there too.

The location of the site within the street network, the building function and cultural context must be considered by the architect on a case-by-case basis, as these factors have a great impact on how the principles can be applied favourably.

IMPLICATIONS

The findings can be useful for architects that are interested in how buildings affect us and want

to consciously design with a focus on urban wellbeing across scales.

The intention of the thesis is that the findings will create more conciousness for architects or urban planners around the effect that buildings have on us. The synthesis of theories and principles offer clear spatial conditions that can increase the potential for creating positive emotional responses, which can guide architects in designing urban architecture.

LIMITATIONS

More literature or other theorietical approaches could add further spatial strategies or have conflicting views on the findings. The time limitation of the thesis period limited the amount of theories that were possible to include. However, the theories overlapped on many aspects, and clear conclusions could be drawn towards the studies examined within the field of neuroarchitecture.

RECOMMENDATIONS FOR FURTHER STUDIES

If the study was to be conducted again, I would include a wider range of theories and strategies to create an even stronger argumentation for the architectural principles suggested or to add a wider range of principles. I would especially include more research into cognitive architecture, as there is an increasing amount of research in the field, and it will probably include further strategies in the future. The principles could be extended and include more principles if there is sufficient research.

To solidify the findings, the specific principles could be tested through neural imaging. Since the strategies are based in theories and observations as well as cognitive architecture and research, it would be interesting to see if they would have the expected potential to trigger positive emotional responses in people.

Further studies could add to the list of principles

in terms of more principles under the existing categories, or adding new categories. However, if similar guidelines are created, it is important to keep them applicable for architects in a design context.

More emphasis could also be added to the context-specific analysis that is needed in order for the principles to be favourably applied. It could be investigated further whether there are other recognised methods of analysis that can enhance the application of principles. It could also be investigated how space syntax could more specifically guide how the principles are used. However, this study focused more on the foundation for the principles and developing the principles themselves.

The principles could also be applied to AI-technology as a tool for architects to use in an early design process.

DO THE PRINCIPLES HELP CREATE A HIGHER POTENTIAL FOR TRIGGERING POSITIVE EMOTIONAL RESPONSES IN PEOPLE?

According to the research that the principles are based on, they should theoretically contribute to creating a higher potential for triggering positive emotional responses in people. However, the principles would benefit from being solidified through experiment-based studies.

Overall, I do believe that if you have principles to follow when designing, you are more likely to be aware of the impact your contribution as an architect has on people. If you know that certain features in the built environment can have a negative effect, while others are positive, you are more likely to choose to build a certain way or further inform yourself about how you can create a positive influence on people as a designer. Because what is the purpose of architects if not to create architecture that makes people feel good?

BIBLIOGRAPHY

Alexander, C., Ishikawa, S., Silverstein, M., & Jacobson, M. (1977). *A Pattern Language : Towns, Buildings, Construction*. Oxford U.P

Alexander, C. (2002). *The Nature of Order : An Essay on the Art of Building and the Nature of the Universe*. Center for Environmental Structure.

Alexander, C. (1979). *The Timeless Way of Building*. Oxford U.P.

Azzazy, S., Ghaffarianhoseini, A., GhaffarianHoseini, A., Naismith, N., & Doborjeh, Z. (2020). A Critical Review On the Impact of Built Environment on Users' Measured Brain Activity. *Architectural Science Review, 64*(4), 319–335. https://doi.org/10.1080/00038628.2020.1749980

Berghauser Pont, M., Stavroulaki, G., Bobkova, E., Gil, J., Marcus, L., Olsson, J., Sun, K., Serra, M., Hausleitner, B., Dhanani, A., & Legeby, A. (2019). The Spatial Distribution and Frequency of Street, Plot and Building Types Across Five European Cities. *Environment and Planning B: Urban Analytics and City Science, 46*(7), 1226–1242. https://doi.org/10.1177/2399808319857450

Berghauser Pont, M., Stavroulaki, G., & Marcus, L. (2019). Development of Urban Types Based on Network Centrality, Built Density and Their Impact on Pedestrian Movement. *Environment and Planning B: Urban Analytics and City Science, 46*(8), 1549–1564. https://doi.org/10.1177/2399808319852632

Coburn, A., Vartanian, O., & Chatterjee, A. (2017). Buildings, Beauty, and the Brain: A Neuroscience of Architectural Experience. *Journal of Cognitive Neuroscience, 29*(9), 1521–1531.

Galle, P. (2020). Christopher Alexander's Battle for Beauty in a World Turning Ugly: The Inception of a Science of Architecture? *She Ji: The Journal of Design, Economics and Innovation, 6*(3), 345–375.

Gehl, J. (2010a). *Life Between Buildings : Using Public Space*. Island Press.

Gehl, J., & Rogers, L. R. (2010b). *Cities for People*. Island Press.

Gibson, J. J. (2015). The ecological approach to visual perception (Classic edition.). Routledge.

Gidlow, C. J., Jones, M. V., Hurst, G., Masterson, D., Clark-Carter, D., Tarvainen, M. P., Smith, G., & Nieuwenhuijsen, M. (2016). Where to Put your Best Foot Forward: Psycho-Physiological Responses to Walking in Natural and Urban Environments. *Journal of Environmental Psychology, 45*, 22–29. https://doi.org/10.1016/j.jenvp.2015.11.003

Göteborgs Stadsbyggnadskontor. (2012). Långgatorna i Masthugget - Karaktärisering och Analys av Stadsmiljö. https://www5.goteborg.se/prod/fastighetskontoret/etjanst/planobygg.nsf/vyFiler/Linnéstaden%20-%20Kvarteret%20Barken-Plan%20-%20samråd-Karaktärisering%20och%20analys%20av%20stadsmiljö/$File/Långgatorna%20i%20Masthugget%20-%20karaktärisering%20och%20analys%20av%20stadsmiljö.pdf?OpenElement

Heatherwick, T. (2023). *Humanise*. Scribner.

Heatherwick, T. (2022, April). The Rise of Boring Architectire – And the Case for Radically Human Buildings [Video]. TED Conferences. https://www.ted.com/talks/thomas_heatherwick_the_rise_of_boring_architecture_and_the_case_for_radically_human_buildings

Hillier B, Penn A, Hanson J, et al. (1993) Natural Movement: Or, Configuration and Attraction In Urban Pedestrian Movement. *Environment and Planning B: Planning and Design 20*: 29–66.

Karakas, T., & Yildiz, D. (2020). Exploring the Influence of the Built Environment on Human Experience Through a Neuroscience Approach: A Systematic Review. *Frontiers of Architectural Research, 9*(1), 236–247. https://doi.org/10.1016/j.foar.2019.10.005

Ozbil A., Yesiltepe D., Argin G. (2015). Modeling Walkability: The Effects of Street design, Street-Network Configuration and Land-Use on Pedestrian Movement, *A|Z ITU Journal of Faculty of Architecture, 12*, pp.189-207.

Ramböll Sverige AB. (2020, September 9). Masthuggskajen Genomförandestudie för Allmän Plats. https://www5.goteborg.se/prod/fastighetskontoret/etjanst/planobygg.nsf/vyFiler/Masthuggskajen%20-%20staden%20växer%20västerut-Genomförandestudie-Genomförandestudie%20rapport%20Masthuggskajen/$File/GFS-rapport_Masthuggskajen.pdf?OpenElement

Salingaros, N. (2021). Chapter 4: Neuroscience Experiments to Verify the Geometry of Healing Environments: Proposing a Biophilic Healing Index of Design and Architecture. In J. B. Hollander & A. Sussman (Eds.), *Urban experience and design: Contemporary perspectives on improving the Public Realm*. Routledge, Taylor & Francis Group.

Schoenberg, P. L. A., A. Ruf, J. Churchill, D. P. Brown, and J. A. Brewer. (2018). Mapping Complex Mind States: EEG Neural Substrates of Meditative Unified Compassionate Awareness. *Consciousness and Cognition 57*: 41–53. doi:10.1016/j.concog.2017.11.003.

Shynu, R. V., & Suseelan, A. (2023). Human Cognition and Emotional Response Towards Visual Environmental Features in an Urban Built Context: A Systematic Review On Perception-Based Studies. *Architectural Science Review, 66*(6), 468–478. https://doi.org/10.1080/00038628.2023.2232339

Stigsdotter, U. K., S. S. Corazon, U. Sidenius, A. D. Refshauge, and P. Grahn (2017). Forest Design for Mental Health Promotion – Using Perceived Sensory Dimensions to Elicit Restorative Responses. *Landscape and Urban Planning 160*: 1–15. doi:10.1016/j.landurbplan.2016.11.012.

Sustasis Foundation, "Christiopher Alexander: Life in Buildings (extended trailer)," interview by Michael Mehaffy, video, March 24, 2016, http:// www.sustasis.net/ CA-FilmTrailer.html.

United Nations. (2018). 68% of the World Population Projected to Live in Urban Areas by 2050, Says UN | UN DESA Department of Economic and Social Affairs. https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html

Wilson, E. O. (1984). *Biophilia*. Harvard University Press.

IMAGES & FIGURES

Unless stated otherwise, all images and figures are courtesy of author.

Alexander, C. (2002). *The Nature of Order : An Essay on the Art of Building and the Nature of the Universe*. Center for Environmental Structure.

Drawings retrieved from Archdaily. https://www.archdaily.com/993277/spaarndammerhart-housing-marcel-lok-architect-plus-korth-tielens-architects

Gehl, J., & Rogers, L. R. (2010b). *Cities for People*. Island Press.

Photograph by Jordan, retrieved 2024 from https://humanise.org/boring-building-index.