DIRECTED MOVEMENT

towards a wayfinding based approach of design

RESEARCH THESIS
by M.D. van Zutphen
cover page
walking business people
by C7group LLC, edited by M.D. van Zutphen
DIRECTED MOVEMENT
towards a wayfinding based approach of design
This research report is written as part of the graduation project 'directed movement'. It forms the base of knowledge for the design of a large scale cinema complex on the South Bank in London which is based on a wayfinding based approach of design.

The motivator for this project is my own fascination of environmental perception. How can the built environment inspire people with its complexity and informality. What drives people to find their way? What messages do buildings communicate? And how do we interact with it? Apparently there are elements or combination of factors which are able to do just that. Looking for the boundaries of informality and complexity are among the central topics in the research, but even more in the design.

I experienced graduation at explorelab as a difficult project; having the freedom to set up your own project, has the downside of continuously having to pull forward your own goals and objectives. However the experience gained by organising your project gave a certain satisfaction when the project was finished in the end.

Finally I want to thank my fellow explorelab students and my tutors who helped my through the different stages of the research. In special I want to thank Anne and my family who always supported me. And everyone else, who I forgot who told it was going to be fine. In the end it just did....
summary

How can the built environment direct our movement? And how should this built environment be designed to facilitate a fluent movement. We have to depend on the environment to guide us through the environment. As designers we set the conditions in which the user has to be able to easily find his way. This thesis considers the designer as a facilitator of an environment which has to support the wayfinding experience. Through literature studies, empiric research and design implementation I searched for the determining characteristics on which we have to depend navigate through the environment and how this information can be designed to respond on the wayfinding needs of the potential visitor.

Personal abilities, mental representation and environmental information are the three main influential factors which covers the process from acquiring the information to the information source that all contribute to the wayfinding performance. Within the personal abilities the focus lies on the wayfinding task of orientation, identification and navigation, how we have to find our way and which perceptive and cognitive processes are involved. This is stored in a mental representation of the environment. How the information is stored influences the accuracy of the information and can tell us what elements in the environment are picked up. The environment can be designed in such a manner that it can aid in a better mental representation and consequently improve wayfinding performances. A small empiric research confirmed the theory set forth by the literature.

The design approach is based on how people experience and see the environment. The characteristics in the environment that influence their movement are the tools of the designer. A different approach to design is explained through the strict differentiation between articulation and organization, perspectives and overview maps. Its considers how an environment is seen as a potential visitor will see the design; it pays attention to what is seen and the relation between different perceived single images. This will allow to better streamline the different recommendations to be efficiently implemented during the design process. The design principles considers the human abilities, their potential to create a cognitive map as well as how the environment can influence this cognitive map through organization and articulation. Recommendations for the different objectives of the wayfinding task will actively help to be aware of how the designer can use to Lynch’s elements to guide the visitor through the building.

The theory can tell us how it should be done, but not how you can implement it in a design process. Which recommendations are suitable for what moment in the process? A design proposal for a public building on the South Bank in London shows how these factors can be incorporated in the design of the environment. The design patterns were used, but not as hard as they were described as they interfered with the complexity of designing. The theory can therefore not dominate a design, but can be useful arguments for design decision. On a larger scale, where the decisions do not impact the whole design, the wayfinding knowledge can be articulated without any consequences.

This thesis describes how wayfinding can be incorporated within the design of the building. The focus lies especially on the application of this knowledge in a design proposal. Wayfinding knowledge can therefore lead a design process towards a building on which people can rely to direct their movement.
# Table of Contents

**Directed Movement Theoretical Framework Testing the Theory**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Directed Movement</strong></td>
<td></td>
</tr>
<tr>
<td>01</td>
<td>introduction</td>
</tr>
<tr>
<td>02</td>
<td>problem statement</td>
</tr>
<tr>
<td>03</td>
<td>methodology</td>
</tr>
<tr>
<td><strong>Theoretical Framework</strong></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>personal abilities</td>
</tr>
<tr>
<td>05</td>
<td>mental representation</td>
</tr>
<tr>
<td>06</td>
<td>environmental information</td>
</tr>
<tr>
<td><strong>Testing the Theory</strong></td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>empiric research</td>
</tr>
</tbody>
</table>
The thesis starts with the introduction of the theme, stating the problem and explaining the methodology. The theoretical framework puts forth the wayfinding task and describes the three influential factors on wayfinding performance: person, cognitive map and environment. The theory from the framework is tested through empirical research. The tested theory is then reflected on the design patterns which recommendations are based on the three influential factors. The application of these recommendations is then explained within the architectural design and its process. Finally, the research is wrapped up through the conclusion and reflection.
Introduction

Architecture, people, user, wayfinding

'Architecture shapes behaviour. That is why we try to create places where people can interact and communicate and where synergy can grow. We believe that buildings, like people, are more than just the sum of their many parts. We believe that it is possible to achieve a synthesis of design, function and context.'

by Kim Herforth Nielsen, partner at 3XN architects in 'mind your behavior'

How powerful can architecture be? Is the architecture capable to let people make certain decisions? Is it possible to direct their behavior? As an architect we design buildings, bridges or cities for other people, but how much do we know about how they are influence by these designs? Architecture has a strong influence on our well-being, as we are constantly confronted with an environment which is designed. Architecture has indeed the power to influence and shape behavior. How we feel and what we do is till a certain degree influenced by the environment in which we live. If the architecture can be used as a facilitator, we can set the circumstances to make this happen.

Piranesi

In this sketch of Piranesi of a fictive prison the idea of confinement is been created in one single image. While watching this picture you instantly become aware of the atmosphere of the space, the stairs, bars and chains which set a particular strong image. We can experience the space, but we are not able to comprehend how the place is organized and we have no idea where the different stairs and walkways lead to. It is both an interesting as frustrating image; the wealth of all these routes and movement triggers the mind, but the complexity and lack of environmental information makes it hard to understand the place. The feeling of being restricted or lost and unable to make a basic understanding of the place and knowing where to go, has been the thought of Piranesi for this image. The influence of what architecture can have on the well-being of the human is clearly expressed in this image and is a main topic within this research.

different views on architecture

In the architecture we can distinguish two different views in what architecture should express and facilitate. First we have a more philosophical approach which wants to express a vision or a statement. It expresses certain ideas and cultural progress in the architecture. An example of this can be found in the inhuman scale of cathedrals or different styles representing different cultural developments. This view considers the people in their philosophical approach as a receiving party.
Knowledge of how people perceive the built environment is essential to design suitable buildings for the users. As in this image of the London Aquatics Centre by Zaha Hadid. Did the architects consider how their design is perceived and experienced by its users? Are the visitors directed by curves in the architecture of Saarinen’s JFK terminal?

The second approach towards architecture is more directly focused on the user itself. It satisfies the different emotional, aesthetic and functional needs of the user. The building is specifically designed for the people to use a building efficient and satisfactory. The wayfinding design approach has its correspondence with this functional approach of architecture.

Wayfinding

Within the wide field of environmental experience and human behavior, the focus lies on the influence of wayfinding. The building should supply the user with the right environmental information to guide him through the building without troubles of anxiety or fear. The focus will lie on the people itself; like the flow of blood cells in the veins are directed through the human body, it depends on these blood cells to be distributed throughout the body to let the organs function. In this way a building needs a same flow of users to let all his functions operate and let the building be successful. To make this work, the architecture has to lead its users through the building and distribute them to their desired destinations and thus direct their movement through the building.

The research report DI RE CTED MOVEMENT: ‘towards a wayfinding based approach of design’ goes into depth about how the architect can facilitate wayfinding performances. Instead of investigating what the impact of design characteristics is, ‘directed movement’ will provide design recommendations applicable from a wayfinder perspective which will allow the architect to support their behavior in their navigation through the building.

3 Steffen Werner, cognition meets Le Corbusier, 2003, 2.
problem | By neglecting the user in a way that he will have a negative experience within the building is something architects need to avoid. The influence of negative experiences in a building should therefore not be overlooked. The feeling of being lost is one of the most important factors which can give such an experience. Feelings of disorientation is unpleasant and has a negative effect on a person’s well being and is expressed through anger, hostility or indignation. People will most likely not return to a building where they previously had a bad experience. It affects people’s attitude towards the building and its corresponding functions, the organizations, companies and functions within the building. As architects, we have to avoid the negative effects resulted from the uncertainty of not knowing where you are or where to go, concentrate on the positive aspects.

theme | Knowledge about what causes this negative experience and thus what we notice and extract from our environment is for an architect essential information for designing a building. The challenge is to make buildings that facilitate the human experience in a positive way; buildings that are easy accessible, allows freedom for people to do what they desire or which keep them excited and trigger their desire to explore the building. Within the study of environmental cognition there has been a strong connection with the wayfinding theme:

'A key function of environmental cognition and spatial representations is to provide the basis for purposeful mobility, that is to support the decision related performances of wayfinding.'


Environmental perception and cognition have strong influences on wayfinding performances. We need information out of our environment to be able to make decision in order to reach the desired destination. It is this information architects need to facilitate a good wayfinding performance for our users. What is this for kind of information? How is this information perceived and processed by the people? And what are the characteristics in the environment helps us to ‘read’ it? The main theme is about how the connection between environment and personal abilities influences wayfinding; the wayfinding performances of people within the built environment.

goals | The focus is therefore to look after the effect architecture has on wayfinding performances and less of the signage of verbal communication. As we walk through the environment we unconsciously try to make sense of the environment to find our way. In the research the focus will be on the elements which make the environment, where the information is extracted from and on a different design approach based on people’s perception and cognition of the building. We need to understand how people interfere with the built environment to be able navigate. Designing with this information during the early stage of the design process can lead to buildings which are more in line with the functionality of the use from a human perspective. If we have the knowledge of the wayfinding problems, we would be more capable to avoid these problems. We can anticipate on potential difficulties people encounter when they have to navigate through the building. This thesis will have two goals: give insight in the wayfinding theory and show how to implement them. Specific design patterns, as a bridge between theory and design, are therefore the aimed product of this research.
In order to be able to find to understand the environmental perception, difficulties in wayfinding and to produce wayfinding design guidelines, the following questions need to be answered:

**What is the influence of the built environment on wayfinding?**
- Which human abilities are involved in wayfinding?
- How is the mental representation of an environment made?
- What environmental features influence the wayfinding process?

Out of the result of the research a new design problem will be put forward. The threshold has to be found between an interesting but illegible and boring but understandable design. Working with these generic patterns in a wayfinding-based approach will not mean that dictate the design process, but let the designer consider the effects. Connected with the design patterns, the result of the research will be shown in an architectural design as an example how the research can be used. Connected to the research question, there is a design question:

**How can the application of wayfinding knowledge aid in the design of better buildings?**
- How does the architecture influence the wayfinding behavior of the visitors of the building?
- How can the design approach influence the architecture?
- How can the wayfinding theory be implemented within a design project?

---

In this rapport different parts of the wayfinding process through the built environment will be explained. The research data has been collected through literature studies and then tested through the use of precedents. Empiric research will illustrate the whole theory about wayfinding with explicit examples found in the buildings and design. Recommendations which arise from these studies will be made applicable according a design approach where organization and articulation are separated. The whole report about wayfinding is in this way structured in theory, testing, application and design implementation.

> theory

The theory will function as a theoretical framework in which specific recommendations for a wayfinding efficient architectural design can be displayed. By an extensive literature study the body of literature about wayfinding in architecture will be explained. The theory will be mainly based on the work of the authors Allen (1999), Lynch (1960), Weisman (1981) and Passini (1984, 1992, 1996) which all have contributed to the body of literature which already exists about wayfinding and design recommendations. Each author will cover different parts of the process and will contribute a specific piece to the theoretical framework.

> testing

By using an questionnaire the theory is tested in practice. Purposes of visits, used strategies, the level of experience, knowledge and skills in wayfinding and making a cognitive map will be recorded. By letting 25 visitors draw a floor plan of the ground floor of TU Delft’s faculty of architecture, the construction and structure of cognitive maps can be discovered. These different representations of the building should show the important elements within the building and will be projected against the made hypotheses based on the theory.
**application**

The problem with the existing recommendations is that they are mostly too vague formulated to be able to be applied in a design. By describing the process and focusing on what aspects of this process needs more attention, it is plausible that it will influence the result in a positive manner. By separating the whole building itself (organization) and what we see (articulation) the different recommendations can effectively be applied by explain where and how the recommendations can be used.

**design implementation**

The implementation in the location, the requirements of the program, the prevention of a too clear and boring environment while making it not too complex will define the design problem. The design will show the different design approach based on wayfinding and the human perception and examples of how the recommendations can be used. The use of a logbook will help to get insight in my own design process.

The focus of this thesis will move from a theoretical framework [chapter 4, 5 and 6] through the empiric research [chapter 7] from theory towards the design. Within the design patterns [chapter 8, 9 and 10] the theory is translated in to applicable principles witch are implemented in a design proposal [chapter 11, 12 and 13].
The literature study will establish a theoretical framework regarding the whole wayfinding process. From a conceptual understanding of the definition of orientation and navigation [a], the wayfinding task will become clear. The focus will shift to the cognitive process of the human mind which involves decision making, execution and information processing [b]. Specific sets of environmental knowledge have particular purposes and thus require different strategies [c], such as piloting, path integration or the use of a mental map (chapter 4).

To use these strategies we have to make some sort of spatial representations or image [d] in our mind to find our way. This image is the result from two different factors: the environment and the person. In chapter 5 the development and the structure of these ‘images’ will be described.

[e] How people transform their image in their mind (imageability) [f] can have a great influence on the cognitive map. This subjective interpretation of the environment is opposite to how the environment is in reality.

In the last theoretical chapter (chapter 6) the focus will lie on the information which is facilitated by the environment. Different information sources of the environment [g] are described as well as the ease how well information can be extracted from the environment (legibility). [h] These theoretical framework will be the base for the design principles in chapter 8, 9 and 10.
First all we have to formulate the wayfinding task: establishing where we are, where we need to go and how to get there. From the definitions we will move towards the person’s abilities towards the different purposes and strategies to use these different abilities. How do we extract the information out of the environment and how do we process and use this information?

**wayfinding goal**

As we travel through our environment we are most of the time unconsciously aware of where we are, where we need to go and how to get there. But above all, we have to find our way from a position A to B. Over time we develop an understanding of an environment which enables us to make shortcuts or to be more efficient in moving from one place to another.

> **orientation**

First of all we need to know our position in the environment, before we can start to plan our route. Wayfinding starts with the notion of orientation which can be defined as ‘person’s ability to mentally represent the spatial characteristics of a setting and the ability to situate him or herself within that representation.’ It is the cognition of the spatial environment with which we are able to place ourselves in the surroundings. The notion of a mental map or cognitive map was first proposed by Tolman in 1948. The ability to make such a cognitive map of the surroundings is essential for orientation. While solving a wayfinding problem we are continuously placing ourselves in this cognitive map in relative to the destination.

> **navigation**

Navigation can be described as a ‘coordinated and goal-directed movement through the environment’ It is the second step of the process; the actual moving towards the destination. Within this definition of navigation we can identify two components: wayfinding and locomotion. Wayfinding describes where we need to go and how to get there. Locomotion is the executive part of the navigation process. It makes sure we are able navigate through the environment, which is to move through the environment and reach the destination.

> **locomotion**

The locomotion process makes sure we succeed in reaching our destination. ‘Locomotion requires us to solve problems such as identifying surfaces of support, avoiding obstacles and barriers, and directing our movement toward perceptible landmarks.’ It is an unconscious process with which we are able to navigate ourselves through our surroundings without bumping into objects and people. While wayfinding demands some attention and cognitive effort, the process of locomotion is thus a more relatively automatic process.
Romedi Passini (1984) defines wayfinding as ‘…a person’s ability, both cognitive and behavioral, to reach spatial destinations.’ With this ability we are able to choose which routes to take, orientate ourselves towards landmarks, to create shortcuts, to plan alternative routes, etc. This part of the process is the most interesting, but it takes the most cognitive effort. Based on how we are orientated in the environment, we make decisions on the acquired information from the surroundings and translate these decisions into actions or behavior. Wayfinding is successful when we reach our goal in an efficient manner. We therefore rely on the environment to provide us with accurate and complete information to reach our destination.

As orientation, wayfinding is a continuous process we (unconsciously) do during our movement through an environment. Orientation is prerequisite to wayfinding: being aware of your location relative to your destination, places, objects or decision points obviously is a fundamental requirement for finding your way. Where orientation is based on the perception and cognition of space, the wayfinding process is a reasoning process. Spatial problems set by the environment needs to be solved to reach the required destination. Wayfinding is an act of problem solving: we have to determine our location within a setting (1), identify the destination (2), to make a plan to get there and execute it while adjusting the plan (3). The wayfinding process required to solve it, includes the processing of information, making decisions and the execution of decisions.

2 Susan Hunter, ‘spatial orientation, environmental perception and wayfinding’ in design resources DR-14 (center for inclusive design and environmental access, 2010): 3.
5 Daniel R. Montello and Sas, human factors of wayfinding in navigation, 2006, 2.
6 Daniel R. Montello and Sas, human factors of wayfinding in navigation, 2006, 2.
7 Daniel R. Montello and Sas, human factors of wayfinding in navigation, 2006, 5.
9 Daniel R. Montello and Sas, human factors of wayfinding in navigation, 2006, 3.
wayfinding behaviour

Purposes and strategies describes routes over which the wayfinder has to go arrive at the destination. Based on our knowledge, our ability in wayfinding, the comprehension of the environment and our purpose we use different strategies to solve wayfinding problems. The purpose and strategy with which one comes to a building determines in which way he will subtract and process information from the environment. These strategies correspond with the capability of the visitor to process the information and make an useable representation. Based on their ability, strategy selection or experience, not all the visitors will be equally capable of using each strategy in a building.

> purposes

According to Allen (1999) we can categorize the wayfinding tasks in three different types based on the purpose of the visit: commute, quest and explore. The definitions are based on the experience you already have with an environment. If you work in the building, you will travel the same route almost daily and you will commute between that place and your home. The purpose of a quest is when you know where to go, but you don’t know how to get there. Exploring involves travelling without a particular destination in mind, except returning to a familiar starting position.

>> commute

The first type involves thus a familiar route between two places. This commute is a routinized process where efficiency is high and uncertainty is quite low. We know almost at the exact time what to expect and how to deal with it. This routinized behavior relies on an automated processing and execution of previous recorded decisions plans. Therefore this kind of traveling does not involve so much attention and conscious effort. However, the traveler will have a number of alternative routes prepared, when he cannot use his primary route. The decision to use one of these routes and the selection of the particular alternative route will involve decision making processes and therefore more cognitive effort.

An example of a commute could be an employee of the Eye film institute. He uses has a different purpose than the average visitor of the place and travels the same route almost daily. His destination is different and the route might also differ as he has also have access to restricted parts of the building.

>> quest

Within the second type we can distinguish the quest. The quest approach of a wayfinding task is to start from a familiar place to a place which is known to exist, but which is not yet visited by the traveler. There is a great deal of uncertainty involved in this particular type. It is uncertain how to reach the destination; therefore the criterion of this task is only reaching the destination. During this process there are a lot of cognitive operations involved in where we need high-level cognitive abilities. Quest is therefore the most interesting purpose, because there is a specific destination, but the visitor has to rely heavily on the environmental information to establish a route to reach his destination.

The purpose of a quest can be identified by a first time visitor of the film institute which wants to see a movie. He knows that he is able to see a movie in which room, but he would still need to find this particular room.
The third type of purpose is to explore the environment. We are moving around in an unfamiliar environment just to stroll or to learn more about this unexplored territory. Typically this task begins and ends at a place that is known, often the same location, but the goal of this task is to discover new places and link them together with other known places. There is a lot of uncertainty involved in this type, because both the route and the destination is unknown. Furthermore, the visitor is not certain what kind of useful information to expect and will not know if he is able to relate his current position to locations he already knows.

Visitors of the film institute which are just visiting to see the building or the free exhibition have the purpose of exploring a place. They are just strolling through the building and act on the environment they perceive without having too much expectations or stress. They are easily tempted to enjoy a coffee and enjoy the view in the ‘arena’.

> strategies
Depending on the purpose, there are different possibilities within the traveler has to choose which of the methods (or which combination of these methods) is most suitable to deal with the wayfinding problems at hand. One strategy is not used dominantly; it is most of the time a combination of one of multiple strategies. It depends on the environment, how the information can be used and whether if there is enough appropriate information available. People use most of these strategies unconsciously and find it difficult to actively report them. The major strategies (piloting, locomotor pattern, path integration and cognitive mapping) will be described, because these strategies are used the most. Minor wayfinding strategies includes following a continuous trail or orientated search. The discussed purposes can be linked with the different strategies as seen in this figure.

14 Laura A. Carlson, Christoph Hölscher, getting lost in buildings, 2010: 287.
16 Gary L. Allen, cognitive abilities, 1999, 554.
17 Gary L. Allen, cognitive abilities, 1999, 554.
18 Gary L. Allen, cognitive abilities, 1999, 555.
>> **piloting**

Piloting involves wayfinding with aid of a landmark or orientation point. The traveler finds his way through a sequence of landmarks where he moves from one to the other. Progress within this process is measured by how far in this sequence the traveler is located. The route is however not fixed; the emphasis lies on reaching the next landmark and there might be multiple possibilities to reach a landmark. The route can thus be adjusted to the needs and desire of the traveler if necessary.

The strategy of piloting can be used for each of the three purposes, but it will have different meaning for each of them. For the commuter the landmarks are mental anchor points and provide confirmation where the traveler is on his route. These mental anchor points or landmarks will also be used by the quest as purpose, but he will base his route upon them. The explorer will use the landmarks as a reference to familiar places. An example of a landmark or orientation point is the arena in the film institute. This element is dominant in the building and the main rooms are situated around this central place. Important for this strategy, is that this area has many views from the passage behind it and is dominant from outside.

>> **habitual movement**

Habitual movement is characterized by a repeated execution, which consists out of a sequence of moves. The traveler uses his memory of previous experiences and references for confirmation. Progress can be measured in where the traveler is in his sequence of moves. Because of the repeated process, the correct route is important and variance in the route is limited. It is due to the repetition that the habitual locomotion emerges, which depends on the consistent demands of the environment and to which degree the experience is extensive. Habitual movement is based on route knowledge where piloting and repetition work together. Although this strategy relies mostly on memories, it uses also the landmarks along the route for confirmation. These landmarks can even be small as the small bridge, the flags or the entrance stairs, which can be seen in the approach of the eye.
>> path integration

With the strategy of path integration, the visitor updates his current location with references to his point of origin. He relies on information gained by moving away from a specific point. The information allows the traveler to compose and follow a direct and efficient route back to his point of origin.\(^{24}\) The path is unfamiliar and thus the only progress can be measured in the sequence of movements the traveler is in. This form of wayfinding is good for developing alternative routes, because it has to depend less on different landmarks.

Both locomotion and path integration refer to the memory, but with the locomotion it is the execution of a routine, while within the path integration the route is new. But the ‘movement monitoring and position updating abilities’ are important in both methods. Landmarks can increase the possibilities of taking ‘short cuts’, which combines the piloting with the path integration.\(^{25}\) The time and accuracy required for a route is related to the amount of landmarks and inter-landmark relations.\(^{26}\) The arena in the eye can be used as a landmark while walking around it, through the surrounding corridor.

>> cognitive mapping

When the visitor finds his way with the use of a cognitive map the traveler refers to his own spatial representation of an environment he has built up through different experiences in that environment. This spatial representation consists out of a structured system of relations between places and is thus suitable for generating potential routes.\(^{27}\)

The use of a cognitive map is therefore highly flexible when it is used in wayfinding. This method gives the user the ability to generate multiple routes and within the best possibilities. In exploring an environment it is used for maintaining orientation. In a quest it is used for reaching the desired destination, while in the context of a commute the cognitive map is used to generate alternative routes.\(^{28}\) However, it will require some experience and understanding of a place to be able to construct a cognitive map. Usability is based on the knowledge a persons has of the environment and is thus so flexible that it is applicable to all three types of tasks. As the understanding of an environment and the amount environmental information increases the cognitive map will develop.\(^{29}\) The arena as a central place can be used to build a cognitive map upon. This dominant area in the building is also a main distribution place.

\(^{21}\) Gary L. Allen, cognitive abilities, 1999, 556.
\(^{22}\) Gary L. Allen, cognitive abilities, 1999, 556.
\(^{23}\) Literature suggest that the abilities which are involved in the repetition of a locomotor pattern have more relation with a perceptual-motor learning task than cognitive test, but there is no empirical study yet which supports the suggestion
\(^{24}\) Gary L. Allen, cognitive abilities, 1999, 557.
\(^{25}\) Gary L. Allen, cognitive abilities, 1999, 556.
\(^{26}\) Gary L. Allen, cognitive abilities, 1999, 558.
\(^{27}\) Gary L. Allen, cognitive abilities, 1999, 556.
\(^{28}\) Gary L. Allen, cognitive abilities, 1999, 556.
\(^{29}\) Gary L. Allen, cognitive abilities, 1999, 558.
**Wayfinding capabilities**

Wayfinding capabilities of the wayfinder consists out of number of things. We have the purpose of a visit combined with one or more strategies. But we have also more processes which happens continuously while finding our way which are closer to the person. We need a working memory, the ability to make sense out of environment. Basically we need spatial perception, motor capabilities, information-processing capabilities and the knowledge to support the wayfinding means and to be able to navigate through our environment.

> **wayfinding process**

Passini (1984) developed a theoretical model of how the wayfinding process works. Within this model he distinguished three tasks in our ability of finding our way: decision making, decision execution and information processing. The model is generic and contains both cognitive and behavioral activities. It covers the whole wayfinding process which a person has to do.

These process continuously takes places along a route, until you reached the preferred destination. Information processing helps us to collect, group and select the information out of our environment to find possible solutions to the wayfinding problem at hand. Based on this information we make decisions to reach the destination. These decisions lead to a certain behavior which corresponds with both the decision and the environment.

*Wayfinding describes a person’s ability, both cognitive and behavioral, to reach spatial destinations.*

by Romedi Passini in 'spatial representations: a wayfinding perspective' (1984)

Together the three processes make sure we are able to reach our preferred destination. The chance of success of the wayfinding depends heavily on the amount of available and readable information which is provided by the environment. The process of decisions making has to be transformed into actions, which have to happen at specific time and space, placing the action in the same environment we extracted the information from. These three capabilities have a relation with the wayfinding task. In order to be able orientate ourselves and identify a destination we have to process information. Decision making and execution supports the wayfinding part of the task.
> decision making

By facing a wayfinding problem there need to be made a decision. This happens on a break in the transportation, a decision point, where a decision need to be made.

The decision making is the reasoning process which happens according the information which is perceived and interpreted through our senses. This information may not be sufficient enough to execute an action to reach the final destination. That is why we have to make additional smaller decisions to solve the initial decision, because the decision of going to somewhere is in itself unable for execution. This the essence of the wayfinding problem; we have to break the decision down in smaller decision and corresponding actions to solve the spatial problem which are set forward by the initial decision.\(^3\)

If we for example are standing on the south bank of the IJ-river in Amsterdam and we want to watch a movie in one of the cinema’s in the Eye film institute; we need to cross the river, find our way to the building, enter the building, buy a ticket at the counter and find the specific room.

>> decision plan

Passini (1984) states that these smaller decisions are structured in certain hierarchies. On the top we have the initial decision: reaching the desired destination. Down below we have the behavioral actions like opening a door. Between these groups we can distinguish a third group of intermediary decisions which links the action with the original task. These decisions lead directly to some sort of action and is over a set of intermediary decisions connected with the original task.\(^3\) In order to reach the film institute, we have to cross the river. The action here would be to take the ferry to cross the river.

The decision making process is strongest when we travel to a novel location. The decisions we make are recorded in a mental structure which is called a decision plan. Within familiar routes we engage less with the decision making part but we only execute the decisions we already made when we ‘explored’ the route: we follow the decisions from the decision plan.\(^3\) But when the repetition of the action becomes larger, the speed with which the actions are done will increase as well.

This structured representation is a decision plan which represents all the decisions which we need to solve the higher wayfinding problem and, it also indicates why these decisions were made.\(^3\) A complex wayfinding task is therefore structured in a clear hierarchy of different subtasks which make the original task easy to solve, because we are solving each of them as a smaller problem. All these smaller solutions and related actions (crossing the river) will eventually lead to solve the wayfinding problem (finding the right room).\(^3\)

---

\(^{30}\) Romedi Passini, spatial representations, 1984, 154.
\(^{31}\) Romedi Passini, wayfinding design, 1996: 322.
\(^{32}\) Romedi Passini, spatial representations, 1984, 154.
\(^{33}\) Romedi Passini, wayfinding design, 1996: 322-323.
\(^{34}\) Romedi Passini, wayfinding design, 1996: 322.
\(^{35}\) Romedi Passini, wayfinding design, 1996: 322.
\(^{36}\) Romedi Passini, spatial representations, 1984, 155.
The subplan is a decision package which contains only two or three decisions. Subplans do not overlap, but they happen in sequence. It is the route of sequential decisions we are following which is broken down into a structured system with a clear hierarchy of subplans. As all of the decisions in a specific column do one decision and the accomplished action has to provide the circumstances for the next decision-action couple. The decision plan is structured into clear hierarchies where every subplan contains only a few decisions. This small number of decisions within each subplan forms the spine of the structure and the ideal memory support. The structure of decisions will allow people to remember long decisions plans with the corresponding solutions for encountered wayfinding problems. By not having to find solutions over and over again, it saves not only a lot of energy, but also the occupation of a person’s mind. The experience of finding your way will be therefore more increased, because as it requires less cognitive load and energy.

> decision execution

People tend to walk in a straight line towards their destination, but tend to cut corners and take diagonal paths. Subplans of the decision plan makes sure we pick intermediate destination to walk to. We always take the furthest anchor point we can see.

Passini (1984) found out people were not able to describe precisely what they were going to do to reach the required destination when they were asked for it. They had a general idea to start with and then worked them out, dealing with each single obstacle along the way. With this method the subject reduces the impact of possible distortions by not making too many expectations, but only reacting on the object which he or she encounters. This leads to more information they obtained and recognized from encountering it, which they were not able to recall actively. It is hard to generate a cognitive map, but it is easier to recall a specific action if we encounter a specific object. By looking at decision plans, we do not necessary need a clear and highly detailed mental image to find our way. The information has to be structured and recorded in such a way that it assures recognition. As long as we have information necessary on the moment we need it, we will be able to reach our destination.
Wayfinding decisions require a behavior and an object or place to execute the action which is triggered by that specific object or place. Decisions which are transformed into behavioral actions will give the user an image or impression of the area based on what we know we can encounter in a certain place and at a certain time. These expectations together form the mental image in which we can store this knowledge about a place. By executing a decision, we match the mental image of a place with the specifics in the environment. Based on this image and in relation with the decision plan we know what to expect in a place and know which behavior is appropriate for this environment. It creates an expectancy to find a specific counterpart at a specific place and at an appropriate time.

Cognitively this is happening on an almost unconscious level: when you are following a familiar path, you will be triggered by the environment and execute a decision plan without being aware that you do it. Details in this process are not essential, as long as we recognize certain characteristics in the environment to know the object of place when we are actually faced with it. Because recognize a environment is cognitively more efficient then recalling, decision plans allows us to execute long decision plans without correctly, efficient and without a lot of energy. However, if there is no correspondence between the expected and the encountered, then new decisions need to be made. This defines the wayfinding problem; being unable to perform an action and therefore required to make new decisions.

the process of making wayfinding decisions | the image gets updated every time it does not match the expected image

\[ D = \text{decision} \]
\[ I = \text{image} \]
\[ B = \text{behavior} \]
\[ T = \text{wayfinding task} \]
\[ \text{ex} = \text{expected} \]
\[ \text{pe} = \text{perceived} \]
\[ n = \text{number of wayfinding problem} \]
> information processing

Decision plans seem to have a generic character. According to Passini (1996) people tend to develop the same decision plans in places where enough information is provided for the visitor. He states that “… the solution to a problem is mostly determined by the available information.”44 The observer need to pick up the information necessary to make and execute decisions, although it has to interpreted, if the information is accurate and sufficient there is a strong coherence among these decision plans.45 The generic human principle is the underlying layer we are looking for in this research. We can assume that the decisions will be more or less the same, when the information is sufficient enough. This means that we can influence people’s behavior by controlling the amount and the type of information they are able achieve at a specific time and place.

>> environmental perception

By perceiving the environment we extract information from the environment, we structure and interpret it so it can be used to use as foundation of arguments for our decisions. There is a constant flow of interaction between the observer and the environment about this information. The environment suggests distinctions and relations and thus certain intended interpretation (design cues) and prescribed behavior46, while the observer selects, organize and give meaning to what he sees.47 J.J. Gibson, a psychologist concerned about the perception of the environment, saw the sense as active seeking mechanisms. Instead regarding the senses of passively receiving environmental information, we are unconsciously looking for environmental information which we can use to find our way.48 Without specific notion of these cognitive processes we move through the environment and assemble the necessary environmental information in some sort of representation.

How the environment is perceived determines the information we process and on which we base our wayfinding decisions on. Knowledge about how this information is perceived is therefore of importance for the wayfinding design. An environment is not only perceived by our eyes; smell, sound or even vibrations are used to acquire information about the environment.49 However there is not much known about this multi-sensory perception and the focus of this research lies more on the visual perception.

‘Any breaks in transportation – nodes, decision points – are places of intensified perception.’ Distinctive features along a continuous route will therefore not be remembered as clearly when the same features happens at decisions points.50

>> visual field

Ernst and Peter Neufert (1980) talk in their Architects’ Data about how the perception of the eye works. In the way these obstacles appear to us, we notice certain patterns which occur to us rhythm or symmetry.51 The eye is sensitive with optical illusion and designers should therefore be careful with applying these optical rules. It, for example, estimates the width of an object better than the depth or height. The depth and/or height does appear therefore larger. Another example is that vertical edges seems to be overhanging at the top, while horizontal edges seems to curve up in the middle.52
The human visual field is 54 degrees wide, 27 degrees up and 10 degrees down. The visual field inside has its influence on how we see space with a higher ceiling height and considers distances. In the approach of a building there are three different positions what determines what we can see of a building. From three times the height we get an overview of the building. From two times the height we will get an idea of its general appearance, while we pay more attention to details when the distance towards the building equals its height.

The field of view and the field of vision decides the measurement of size. The size of the field of reading defines the exact differentiation of details. This knowledge was already used in the classical Greek temples. The size of the details were so designed that they fall exactly in the reading field of the human eye. Within the visual field there are zones with more perceptual attention such as ‘floor surfaces, or nearby facades at, or slightly below, eye-level’.

Ernst and Peter Neufert defined different principles which the eye uses in the environmental perception.

44 Romedi Passini, wayfinding design, 1996: 322.
52 Ernst and Peter Neufert, Architects’ Data, 1970, 25.
scanning and glancing

The visual aspect of environmental perception relies on the process of scanning and glancing. We observer the environment, but we only see specific parts of it. While we move through the environment we continuously scan our visual field to identify interesting objects and pieces of information. The eye focuses upon these specific parts of the environment for a short period of time. The image of these objects is, during the glancing of the eye, held in the short-term visual memory until it can be processed to a further memory with more capacity.

Visual scanning works for distance views as good as for close-up views. The ability to see distant cues in the environment, allows people to perceive and direct towards a distant element of interest instead of having to take more intermediary decisions to get there. Through the visual access of these clues and the human ability to perceive these distant cues, more environmental information can be perceived and wayfinding tasks can be simplified.

figure versus ground

We need to see the distinguish the different elements to make sense of our environment. Within the visual perception the eye uses Gestalt principles to organize the visual field. In order to be able to make an image of the environment, the mind continuously have to distinct wholes. Gestalt principles are the conditions that regulate how whole figures can be grouped in within the overload of data that reaches our eye. They structure and group the environmental information in such a configuration – based on the principle of figure and ground - that we are able to distinct wholes. It is this Gestalt theory that can help architectural compositions and let building components to be perceived as ‘strong, coherent and highly legible objects and configuration of objects.’

By decomposing a complex scene we separate relative units where we can interact with; Gestalt patterns enables the human to decompose a complex scene with the distinction of wholes in our perception and thus with recognizing the organization of integral figures or patterns. This distinction helps to differentiate different ‘figures’ from the background, different figures from each other and figures within figures. It helps to characterize the spatial relationships within an environment and recreate them mentally in a cognitive map.
The five major Gestalt-grouping principles are the law of proximity (we group the elements which are closest to each other), the law of similarity (we group the elements which are similar to each other), the law of continuation (we group elements on basis of smooth continuation), the law of closure (we prefer closed forms, so we decompose images to have closed forms) and the law of symmetry (we prefer symmetrical figures, so we decompose image to have symmetry). Symmetry enables us to group completing elements into a whole.

The process of environmental perception involves four different dimensions which operate simultaneously: the cognitive dimensions is concerned with understanding the information, the affective dimension project our feelings on the perception, the interpretative includes the meanings or associations with the environment and the evaluative dimension gives value, preferences and determination of ‘good’ or ‘bad’ to our perception.

>> cognition

Because it is hard to know which personal interpretations individual could give to the perceived information, the focus will only lay on the cognitive dimension of perception. Cognition is how we interpret the information. This dimension has the most generic character, which can be used for creating the generic design patterns which is the goal of this research. During the perception of the environment our mind is constantly processing and restructuring of environment information. This environmental cognition consists out of the mental image; knowledge people have of an environment and the spatial understanding of the environment, which can be described of a cognitive map. In order to understand spatial characteristics of an environment the wayfinder must have a temporary memory for propositions and be able to reconstruct accurately the spatial relations which are determined by the environment in a mental representation.
In this scheme the different information processes are displayed. The environment controls the input of the system. This stimulus characterizes the structural qualities of the reality. The senses collect all this information and send it to a selection system, which focuses on particular elements which were dominant during the observation of the environment. The selected information is stored in the short term memory. The human mind is limited in recording unstructured information, it is only able to store three to four items of information in the short term memory. Then the information is sent through a transfer unit, whereby the information is simplified and details are neglected in order to store more permanently in the long term memory. Then the retrieval unit can reenact information from the memory if necessary. Eventually this will result in a response on the environment in form of an action of behavior which is based on the environment.

Interesting for the designer is what characteristics of the built environment are memorable in the environmental cognition. Research studied these physical and non-physical characteristics and concluded that four factors can positively dominate our memory:

- The contours of the building | imageability and distinctiveness expressed through the form, size or complexity.
- Visibility and access | the degree to which it is possible to enter and move around the building.
- Use | Buildings housing important functions are better remembered.
- Symbolic significance | historical and cultural meanings or with an important role for society.
The route or purposes defines the strategy and how we look at the environment. Our own capabilities allows us to synergize these image and carry out the wayfinding task.

The process of achieving a destination thus relies on two main components: orientation and navigation. With orientation we continuously define where we are, where navigation makes sure we reach we the destination. The primary process is to make a plan how to reach the required destination (wayfinding) and to make sure we arrive there safely (locomotion).

The purpose of our visit determines in certain ways what specific information we are looking for and which strategies we use to accomplish our wayfinding tasks. The three different purposes (commute, quest and explore) include a particular base of environmental knowledge and are linked with particular strategies.

The wayfinding component can be broken down in three components: decision making, decision execution and information processing. The decisions are recorded in a decision plan. On sequential base, higher-order decisions and actions are divided. In this way long decision plans can be re-enacted because it is broken down in little components. The most interesting is the information processing component. We need only small cues to confirm that we are on correct route of the decision plan.

In order to find our way, we have to make certain decisions of which route we have to take based on the environment and what kind of information we are looking for.

---

Wayfinding starts with the assembling of knowledge through perception of our environment and images needed for a mental representation. We extract certain information from our environment which we use to make certain decision. Wayfinding behavior depends on what information we perceive and how we structure this information. A mental image helps to structure our knowledge and to make a cognitive map. In order to design an environment which is easy to navigate in, we need to know how people make sense of the environment while performing a wayfinding task.

mental image

A mental representation of our environment has in the literature described as many different things, for example a cognitive collage (Tversky 1993), cognitive atlas (Hirtle 1998) or cognitive map (Kuipers 1982). Research of this mental representation started around 1940 when psychologists like Lord (1941), Tolman (1948) and Griffin (1948) started to argue for an organism's cognitive ability to represent space and to use it to store information. The study of an 'image' has been further developed by the work of Kenneth Boulding (jaartal). He purposed a theory of images people make of an environment. In order to understand people's behavior, we need to understand their image. Kevin Lynch's (1960) *The image of the City* goes further in the mental mapping research. His aim was to develop a theory of how we perceive the city and make an environmental image of it. The theory is based on the concept of imageability: 'that quality in a physical object which gives it a high probability of evoking a strong image in any given observer'. Lynch argued that a high imageability is the degree how easy different parts out of the environment can be selected and structured to be able to form a coherent pattern. This eventually will lead to a better and more intense experience of our physical environment. A mental image is defined as the collection of environmental information we have of a place.
collecting the image

For architects it is important to know how their building are going to be used and perceived. The knowledge of how the mental image of a building is presumably going to be inferred or constructed from the appearances of the building is valuable information in the design process. This cognitive process of construction of the image is a process that happens unconsciously.\(^6\)

> synergize the image on a cognitive map

The difficulty in the perception of architecture is that it is perceived by our movement through time and space; the scale of cities and buildings are too extensive to be apprehended together in one single viewpoint. The building is intended to be perceived as a whole, but can never be perceived as such. Instead we collect different unconnected fragments of the building which are constructed into a coherent image out of ‘series of overlapping urban perspectives, which unfold according to angle and speed of movement.’\(^7\)

These different collaborating parts information of perceptual fragments are, by our movement through the building, continuously stored, synthesized, connected and updated in the mental representation of the building to create a perceptual totality of the building.\(^8\) This whole representation can never be seen in the real environment, but only as an overview map, and will be slightly different for each person due to subjective attachment and personal capabilities.

The human mind is capable of constructing these images of wholes from the ever-changing stream of sensory input, caused by the changing perception by our movement through a building. The mind has continuously taken in account visual overlap, reflections and perspective distortions to generate a whole and correct image.\(^9\)

It is like assembling parts of a puzzle, as a floor plan, together where every part fits in a specific spot. If a majority of parts are assembled according the right organization, the whole figure can be seen. We need to understand the organization of all these fragments of environmental we gather at various points over time to be able to comprehend the environment and to represent the information in a cognitive map.\(^10\)

---

3 Romedi Passini, spatial representations, 1984, 153.
Kaplan and Kaplan noted that a topological representation of the information comes from many small incomplete pieces we see of the environment. This representation is the minimum a person can make under in a certain time frame or with not the accurate information. The image which is created is a vague image with unclear boundaries which is open for more input. It is not one singular image it’s more like an assembly of images we have about an area which will adjust itself based on the subjective interpretation of the objective world, which we receive any second while we are moving through the city.

These sets of images are in the mental map arranged in series of levels and scales. If there is little spatial relationships between different building parts, floors or rooms, then the viewer will have a hard time linking the particular sets of images together. (spatial correspondence) After a major change, the continuity in the image remains important. The viewer will “adjust his image to secular shifts in the physical reality around him.”

Based on different viewpoints, time of day or season elements can have a different meaning depending on for example opening hours of an institution.
cognitive map

In the process of mapping a new environment our mind need to structure the information in a particular way to be able to make a workable spatial representation of the environment. According to Lynch (1960) images of the environment are constructed by interplay between the environment and the observer. We constantly test and match our image:

"The environment suggest distinctions and relations, and the observer – with great adaptability and in the light of his own purposes - selects, organizes, and endows with meaning what he sees. The image so developed now limits and emphasizes what is seen, while the image itself is being tested against the filtered perceptual input in a constant interacting process." 14

Although the objective world might look sometimes chaotic and unorganized, our mind will structure as much as possible by giving it identity and meaning. The coherence in order and structure in the image exist through familiarity. 15 A mental image can be broken down into three components: identity, structure and meaning. Although they always appear as a coherent image, we can break it down to come to their essentials:

"The environment suggest distinctions and relations, and the observer – with great adaptability and in the light of his own purposes - selects, organizes, and endows with meaning what he sees. The image so developed now limits and emphasizes what is seen, while the image itself is being tested against the filtered perceptual input in a constant interacting process." 17

>> Identity | this implies the distinction from one object to another. People recognize and distinguish objects as a separate entity. We can for example distinguish the shape of the door and know that it is a door.

>> Structure | the observed must have a spatial relationship with the observer and other objects. This involves the door’s position and our relative position to it.

>> Meaning | the objects must have a meaning for the observer. This can be either practical or emotional, but it will most likely trigger the observer to go into action. 16 We know that we can use the door to enter or leave a space.

"The first prerequisite for such perceptual support is the achievement of identity by the singular and continuous quality The essence of this type of element is that it be a distinct, unforgettable place, not to be confused with any other." 18

>> identity

Distinction between area’s or elements helps to separate the different entities. By giving them their own identity, that place or element will function as a mental anchor point within the cognitive map. Differentiation is therefore essential for identifying the options for decision making as well as marking that decision making moment in the mental representation of the environment. Elements are better remembered on particular moments of decision then a continuous element along the route. 18
Distinctive views of environmental characteristics, unexpected changes and strong contrast in the building will help wayfinders to construct a wider cognitive map. The uniqueness of a place is enhanced by the contrast with the environment. If no clear identity is present, then people tend to pay attention to smaller distinct details. This can be less reliable as smaller features are not always good to spot. However, too many distinctive features makes it harder to establish an identity. This happens when there are more than three elements of the same appearance. Gaps of identity in the environment, although physically close together, can cause larger gaps within the cognitive map.

**structure**
The way a cognitive map is built up is determined by how the information is structured and which elements in the environment are considered as the most dominant. Depending on the type of environment and the predominance of particular elements, there are a number of ways to structure a cognitive map.

1. recorded landmarks which are used as anchor points and subsequently filled in paths
2. it can be developed along and outwards from familiar lines of movement,
3. constructed from an enclosing outline,
4. laid down pattern (grid) then adding detail,
5. started as set of adjacent district then add detail
6. or developed ‘from a familiar kernel, a dense familiar element on which everything was ultimately hung’.

There is a high level of flexibility in these maps, all though the sequences are most of the time correct, but distances and forms can be distorted and later on adjusted. Exceptions on these organisations are well noticed and have thus an articulated position in the cognitive map.

The organization of the mental map is essential to place the different observations in and to orientate and navigate yourself. Orientation is for example hard in areas where there is an irregular pattern of paths that are not noticeable connected with each other in a readable configuration. Derk de Jonge (1962) found out that when people fail to see the structure and the environment does not provide clear distinctions, people will concentrate more on details and isolated or poorly visible landmarks, till they have found something to structure their cognitive map upon. These actions are harder to predict for a designer.

The quality of the information is of most important for the people to be able to construct a good mental map of the environment. People always look for a certain organization principle of the building; thus the manner how a building is build up. An unclear organizing principle can lead to misreading other wayfinding information. If people think they identified a principle, they will structure their mental image according this principle. Major distortions will be created to fit the information in the identified principle.

According to Lynch’s (1960) research most observers grouped their elements into groups which are interdependent and have strong relations with each other.

**meaning**
Lynch’s theory has been tested and reconfirmed and therefore established as one of the main theory about wayfinding and imageability, still Lynch has been often criticized for its focus on physical characteristics of the environment. Appleyard (1980) argued that the meaning of the environment was too much neglected by Lynch as an important contributor to imageability.
Its functional nature or significance of use, but especially the socio-symbolic or socio-cultural meaning heightens the sensory experience of a place. People are less likely to recall the physical features of an environment if they can associate it with a function, use or any other label. Increased imageability is therefore ‘more than creating legible objects and places but also endowing them with meaning of animating them, and of stimulating the active involvement of the participants.’ In this light, Appleyward (1980) contributed to the cognitive mapping techniques by adding the affective dimension. Imageability is increased when functional and social meaning enriches the environmental experience. The design should be able environment able to simulate the interest of the user and try to reinforcing the already existing social meaning.

**elements**

Interesting for the cause of this research is what elements are selected by the people to make their mental map. Lynch (1960) found out on a city scale that people use five elements (paths, edges, districts, nodes and landmarks) to build up their cognitive map. The importance of the individual elements can vary, but are considered as the basic building blocks of the mental map. These elements form mental building blocks in the cognitive map and affect the imageability of a city. On this urban scale these elements helps people to be able to navigate themselves to find our destination. The identification of the elements in the physical environment that influences the mental map and the wayfinding performance is important for the design process. If it is clear what these features are that makes architecture more imageable, than we can incorporate that in the design.

> **urban elements**

**Paths** | Ways by which the observer moves through the city. The paths can be the streets, walkways, cycling paths, canals or railroads. In most images these are the predominant elements. Other environmental elements are situated next to it and have a relation with one or multiple paths.

**Nodes** | Strategic points in the city where towards and where from the observer is traveling. They can be junctions, bus stations or a place where paths merge together. Primarily this seems like the focus points of the paths, but nodes can also be the concentration point of a district, in which they can be called cores as well. These nodes, can for example be particular events on a path or concentration of activities, can be seen as a dominant factor in an image for their value as decision point or meaning of activity or place.

---

29 Derk de Jonge, images of Urban Areas,1962, 286.
31 Kevin Lynch, Image of the city, 1960, 83.
32 Romedi Passini, Wayfinding in architecture, 1992, 112.
33 The dimension which considers what environments mean to people and how they feel about it.
34 Romedi Passini, Wayfinding in architecture, 1992, 106.
35 Romedi Passini, Wayfinding in architecture, 1992, 111.
36 Kevin Lynch, Image of the city, 1960, 47.
37 Kevin Lynch, Image of the city, 1960, 47.
Edges | Boundaries between two entities or breaks in continues elements. Edges are mostly more soft than hard. Also borders and can be used as edges to separate or to join other elements. They form the less dominant organizing factor which help people to hold generalized areas together in their image.

Districts | Districts are the regions in which the people divide their city. The people uses the districts as ‘exterior references’ to identify where they are. The districts are distinguished by each other through the different identities districts can have.

Landmarks | Landmarks are point-references like nodes, but landmarks are external; they stand in some way out of their environment. They can be far away and easily to spot or a mobile point like the sun. Other landmarks are more local or smaller in scale. They can be the details that give shape to the identity of neighborhood. When a journey becomes more familiar we seem to rely more on these clues of identity as confirmation of our route.

architectural application

All these elements defined by Lynch are applicable for the city scale. But are these elements also capable for structuring a cognitive map on a smaller scale of a building?

Research done by Romedi Passini (1984) confirmed that elements of Lynch are indeed applicable to buildings. Despite the adjustment of scale, the five elements of Lynch do also apply to buildings:

The paths, ‘the channels along which the observer customarily, occasionally, or potentially moves’ can be compared with the vertical and horizontal circulation system in the building. Specific to a building are the vertical routes, which seem to be very important as they turn up quite early in a reconstruction of a cognitive map and on which people tend to build their map around them.
Nodes: "the strategic spots in a city which an observer can enter, and which are the intensive foci to and from which he is traveling." In a building these are the important circulation intersections, halls and indoor squares. It is only the down scaling of the nodes we see in the city to the building scale; they still function in the same way.

Districts "medium to large sections of the city, conceived of as having a two dimensional extent...which are recognizable as having some common identifying character". Districts are like area's where districts can have different subzone's. Districts are translated through the different scales; on the city scale, the building functions as a district where the different subzones. Specific for the building scale are the changes in floors; districts are associated with floors.

Edges: 'the linear elements not used or considered as paths by the observer. They are boundaries....edges may be barriers'. On a building scale, an edge is a wall with points where the barrier is broken. These walls can have the character of landmark or path. In the spatial configuration of a building, a floor can function as an edge in the cognitive map.

Landmarks by Lynch described as 'a type of point-reference ... a rather simply defined physical object: building, sign, store or mountain'. Within the building Passini noticed that people used a lot of indoor reference points. This can be explained by the reduced visual accessibility of major landmarks. Functions, the landscape, decorative and structural elements where used as mental anchor points. Even entire spaces were used as orientation points as long as they had a degree of distinctiveness from other spaces.

---

38 Kevin Lynch, Image of the city, 1960, 47.
39 Kevin Lynch, Image of the city, 1960, 47.
41 Kevin Lynch, Image of the city, 1960, 47.
42 Romedi Passini, Wayfinding in architecture, 1992, 112.
43 Kevin Lynch, Image of the city, 1960, 47.
45 Kevin Lynch, Image of the city, 1960, 47.
47 Kevin Lynch, Image of the city, 1960, 47.
Distinction of Lynch’s elements is not easy and the elements cannot always be strictly defined, because certain features or characteristics of environment can take on more than one meaning. These elements are not just raw independent material, but need to work together to form a coherent and workable image. As one element can distort a whole image, it is therefore important to always consider the elements in their context. These elements work through different levels and scale and have to put into play with tact, because they can easily conflict but also enhance each other. For example, within a district other elements can structure that same district, giving it more identity. According to Lynch’s (1960) research most observers grouped their elements into groups which are interdependent and have strong relations with each other.

development

Representation and mapping of the spatial characteristics of the environment happens in the cognitive map. Two types of maps can be distinguished: a sequential map which represents a particular route and a coordinative representation in the form of an overview map. Based on the environment and the knowledge we develop different maps. Based on the completeness of representing the environment, these maps are divided in different stages.

>> beginning of a cognitive map
The first time we visit a place we have little knowledge of a place. We will create a decision plan during the first visit and we will explore the organizing principle of the building which allows us to structure the environment spatially and by this structure will be able to store information. We need to know where we are and have limited information of the destination. (1)

>> landmarks
In the earliest stage the knowledge is based on the presence of landmarks. We look for specific characteristics, like tall buildings, special facades or certain activities. These elements are free and have no interrelation with each other. They are disjointed elements with which navigation is difficult. The next step is adding general connections between these mental anchor points. (3) It gives a sense of general directions and perhaps relative distances which we can use in the environment to search for these points. (4) The points however stay disconnected.

>> sequential map
The sequential map can be structured upon a specific route with decision points, “that is, the points where they change direction, the angle of directional change, and a measure of the distance from one point to another.” A decision plan can form the basis of such a sequential map. The decision making during on exploring a new route seems to be, according to Passini (1984) an ongoing process which is not only based the present spatial representations, but on the information which is stored during the trip and on similar experiences and their corresponding previous decision plans. The design execution which is the dominant component on familiar routes relies on the information from the image. But by re-enacting previous stored decision plans, it allows the visitors to extract a sequential route-type presentation out of the hierarchical structure of action and behavior. This sequential type of a cognitive map is the first level where mental anchor points are connected, ordered and structured in a specific sequence. (5)
According to studies done by Hunt (1984) people made the best mental image of the environment when decision points occurred on place with landmarks. Based on the landmarks they could re-enact which decision they made last time when they encountered that same landmark.

**topological knowledge**

The development will eventually lead to more topological knowledge about how these landmarks relate to each other and how they are connected through paths. Only later on, assumptions about the local directions and distances will be estimated and will continuously be reconfigured. This second level of a sequential map contains the navigation path and is based on how we experienced one specific route. It thus does not yet contain enough information to allow for alternative routes and is strongly based on the movement of the user from its own viewpoint. A highly developed decision plan is therefore only "the basis of linearly and temporally organized route-type representations" in contradiction to a more spatial overview representation which is based on the organization principle of the environment/building. By getting more familiar with the route, eventually other paths will be discovered and added to the mental map. These paths will later on create different routes and forms a first attempt to create an overview map.

**overview map**

People can also record the relations between mental anchor points directly in an overview, without relying on a specific decisions plans. Overview maps form the next level of spatial knowledge. It allows people "to locate landmarks and route within a general frame of reference." It integrates multiple viewports, making it less subjective and easier to store more information. These overview spatial representations can be built out of a structured ordering of spatial units based on a specific principle (for example grids) or through Gestalt principles which organize space in simple and comprehensible forms. Connections are multiplied and the whole structure becomes more rigid. It is also possible to easily add new parts of the map and the density of characteristics of a place will increase.

**update connections**

As we learn more about an environment the connections between places will be more representative to the actual environment. Distances will be more accurate and more alternative routes will be discovered to make the survey map even more complete, allowing it to facilitate alternative routes and correct time estimations. Complex environmental structures will slow the development of cognitive map and can lead to representational inaccuracies. But the complexity also trigger people’s interest for the environment.

Kuipers (1983) suggested that within the cognitive map there are two different types of environmental information. The first is a topological one that facilitates the ordering of places and shows the hierarchy and the relations of spaces. An easily identifiable organizing principle will help to structure the information accurately. The second are the metric relations between spaces. It shows the direction and distances between places. As we learn more about the environment, these connections will be updated and will become more and more accurate.

---

49 Romedi Passini, Wayfinding in architecture, 1992, 114.
50 Kevin Lynch, Image of the city, 1960, 83.
51 Romedi Passini, spatial representations, 1984, 162.
55 Romedi Passini, spatial representations, 1984, 153.
Images for orientation purposes must be sufficient in the sense that it needs to get the observer home. The information can be right or wrong, but it must be readable. The map should adapt for alternative routes and therefore be open-ended, so it allows the individual to update and extent its image. A good image should be communicable to others, however this is subjective to the extent what people prefer in a map (economical and sufficient or open ended with more freedom).

According to Lynch (1960) there are certain distinctions in the different observations he made for supporting his theory. The difference is clear in how the image is created. Is the image abstract and highly structured or is it a vivid detailed image with a rich distinctiveness in detail. Image can be distinguished according their different structural quality. It’s important for the accuracy of the representation how different parts are arranged and connected with each other. This organization can work through different scales, where a hierarchical structure is built on elements with are part of bigger wholes. Other can be seen as more dynamic maps. These are more sequential and detailed as a experience of movement through the city. An image is of greatest value when it can be seen as a dense, rigid and vivid image, where all the element types and characteristics are closely connected. Structuring and identifying different parts of the environment remains an important base for the accuracy of mental maps. By reenacting mental map of a particular elements in the cognitive map, Lynch discovered that the following trends were visible in the mental image of people.

**>> simplification**

People tend to store the representations as simple as possible. Details disappeared or were of no significance and loose parts were connected in aspiration of a clear Gestalt representations. By filling up gaps and standardize small deviations in the most common manner. These simplification were reflected upon the environment, which lead to wrong representation of this environment. People tend to structure their image on a principle, where secondary characteristics are neglected.

The transfer unit reorganizes the image and dispose it from details, even when it leads to distortions of the image. The image get stored in a ordered and structured manner, independent images are so combined to form a logic unity and complex forms will be simplified to simple patrons. The human brain uses certain principles as closure, conciseness and symmetry to make this possible.

**>> Closure appears when there is a circle with an opening and the human mind has the tendency to close the circle and to make a whole.**

**process of closure**

**>> Conciseness makes a small offset slowly disappear by improving the figure to make it a more perfect form.**

**process of conciseness**
Symmetry tends to transform an asymmetric figure to a more symmetric figure.

accentuation
People tend to overemphasize particular parts, characteristics or special elements in their environment. Striking elements appear more on the foreground and are highly accentuated and in detail described. While familiar and striking objects are emphasized, ordinary and not remarkable objects are neglected which results in an incomplete map of the setting.  

distortion
Objects are joined or rotated in the cognitive map, while this was not the case in reality. These objects are changed in the representation to satisfy the human perceptual needs. Despite this distortion there is a strong coherence between representation and reality. This is described by Lynch as 'topological invariance', where directions can be bent and distances are extended or shortened. Distortions can be allowed till a degree which enables the cognitive map to still guide the wayfinder his way towards his destination. However if the distance is with success estimated, it can give the user a feeling of pleasure when one reach the required destination within the estimated time and space. If not, he will over time adjust automatically his cognitive map.

metric relations
There are certain characteristics in a cognitive map that are generic. How big and dominant an element or place is projected in the cognitive map is determined by how important the place for an observer is. Important places are bigger projected in the cognitive map then they really are. This tends to be also true for distances between places; “people are not very accurate in estimating routes in metric units, although they may be quite able to judge relative distances”. Relative distances tend to be longer when it has more distinctive features that form mental anchor points along that route. Gaps in a cognitive map happens through a lack of identity within the environment.

Distances to places that are more appreciated, seems to be shorter in relative distance then places who are disliked. Due to a clustering effect in mental representation places can be closer and farther away then they are in reality. Two places in the same district seems to be closer to each other then places in two different districts. People have a preference for simplified and articulated elements which can be easily mentally stored.

---

59 Romedi Passini, spatial representations, 1984, 163.
61 Martin Raubal and Egenhofer, comparing the complexity of wayfinding tasks, 1998, 897.
62 Romedi Passini, spatial representations, 1984, 159.
65 Martin Raubal and Egenhofer, comparing the complexity of wayfinding tasks, 1998, 897.
conclusion

The spatial understanding of an environment can be made in a mental representation of the environment. This mental representation is build up out of overlapping perspectives or viewports called images. These images are through time and movement interrelated and synergized till a coherent image. Knowledge is stored within a mental image and spatial information within a cognitive map.

The development of this image goes from the presence of specific places to a route. This route is through multiple connections extended to a topological network represented in an overview map. The metric relations and Euclidean distances and orientation are improved through familiarity.

Kevin Lynch (1960) identified specific elements on an urban scale in our mental image: path, node, districts, edge and landmark. Together these elements form the mental representation we have of an environment. Romedi Passini found out that Lynch’s elements are directly applicable in architecture and can have different characteristics in buildings.

The image is organized through identity, structure and meaning. These components make the mental images of a place through which we can navigate and orientate ourselves. The way the information is processed and stored is determinative for the accuracy of the representation. Through Gestalt-principles the image can be simplified, distorted and specific elements can get accentuated. The accuracy does not matter that much, if it makes us accomplish our goals and we can use it.

---

69 By letting people draw a place from memory, it is possible to see how their mental map of a place looks like.
70 C. Steffen, De Stadsvoorstelling (Delft: Centrum voor Architectuuronderzoek, 1980), 11.
75 Maarten van Zutphen, ‘Can you show me the way to Newmarket?’, (Dublin: University College Dublin, 2012)
76 Maarten van Zutphen, ‘Can you show me the way to Newmarket?’, 2012
77 Derk de Jonge, images of Urban Areas, 1962, 288.
Now there is elaborated on how the environmental information is processed and structured by the human mind, the focus will now lie on the information which our stimuli receive in order to make this mental image. We use certain information from environments (cues) to acquire information to make a representation of spatial knowledge in our head. With this we are able to store information, which we use to base our actions and behavior upon. How can the architect influence this process? Supply the user with the right kind and amount of information at that specific moment when the user actually needs that information?

**information selection**

A cognitive map is a common product of the environment and the person itself. In psychological terms this can be described that the representation subjected to a ‘cognitive selectivity’: ‘the tendency of the individual to select certain objects and details from his environment in the act of information processing.’ This cognitive selectivity is caused by the stimulus object, which has characteristics and the capacities of the subjective individual, which receives and interprets this as stimuli. The wayfinder must select the information relevant for solving the wayfinding problem.

Previous research shows that while executing a decision plan the wayfinder will only look for information directly applicable to make that one decision. Relevant information for future wayfinding problems tends not to be seen. As architects we must provide the right amount of environmental information at the right time. This relieves the wayfinder from continuously orientate themselves when the building provides the correct information to indicate the right navigational choice when these decision point arises on the route. The amount and quality of the information influences the wayfinding performance and the accuracy of the cognitive map.

We need to strip the noise of unnecessary information to communicate a clear message. The question is what this right amount information is. We cannot expect that a visitor gets every clue a building has to offer. Mallgrave (2011) describes in his book *The Architect’s Brain: Neuroscience, Creativity and Architecture* the process of how the right information is selected from the environment:

“To carry out this distributed parallel-processing task, the brain will thus tend to abstract or draw out the essentials of each visual event by searching for constants. The brain is in essence genetically programmed not to get bogged down with particulars because they would only complicate the process, and because the mature brain in fact has an experiential bank to draw upon.” 18
information overload

The environment always contains more information than we are able to process. Selective perception is therefore necessary when people encounter an excess of information while they are looking for specific information in a confusing environment. If this is not possible, the observer will experience a situation of information overload. Perceptuocognitive behavior is the notion of information overload; too much information comes to the people and due to the amount or the illegibility of information we are not able to distillate the right information.

'However, it is not so much the amount of stimulation that creates information overload – people have developed means to ignore what they do not need – but it is the necessity to check that stimulation in order to extract the relevant information for wayfinding that results in overload.'

The short-term memory can only hold a few images, so if too many units of information are held it will jam. It will interfere with the glancing mechanisms and influence the quantity and quality of absorbed information. This can result in a condition where relevant environmental information is seen, but is not processed as such.

situations of information overload

types of environmental information

Supportive environmental information can have two distinct objectives: it can explain a whole decision plan along a route or it contains only the basic indications to develop a decision plan: this refers to the different cognitive maps: sequential or route. In here we recognize the two cognitive maps: sequential organized information or spatial comprehension arrangement of the setting.

An ensemble of directional signs at each decision points can functions as the equivalent of a decision plan. The place of information system are on the places when speed and ease of wayfinding are of prime importance (emergencies). When basic information is completed with own knowledge, it has to be activated when visiting an unfamiliar setting. This contributes to the experience of a setting.

7 Romedi Passini (Passini; 34) "It should be noted that a lot of stimulation does not in itself necessarily lead to overload. The environment always contains more information than we can process. Overload occurs when stimulation interferes with purposeful information processing. It is only when a person is actively looking for information in a confusing environmental context that the risk of overload occurs."
When providing basic information, you have to account for all decisions of the diagrams. Through the movement through the environment we can make a distinction between

- no-choice situations, where there is no need for additional information;
- information that can be assumed to be common knowledge \( I_m \) or that is easily inferred \( I \) by the user, like the expectancy to find particular things at certain places.
- sensory information \( I_s \) provided by architectural elements and spatial configuration of the building
- sensory information facilitated by graphic and verbal communicators like signs, maps, models or information booth.\(^7\)

The wayfinding goal of a building is to communicate its organization principle towards the user, so it can be used to construct a cognitive map on it. The difficulty of making the right decision depends on obtaining the relevant information at the appropriate time.\(^9\) Although the spatial layout of a building is also the source of potential wayfinding problems, at the same time it provides also the information necessary to solve these problems.\(^9\) If the user is aware of the buildings organization wayfinding performance will obviously increase. The goal of the design should therefore be to facilitate a setting for the people so that they can understand its spatial characteristics to solve these potential wayfinding problems. Especially in large environment, where we cannot comprehend the whole layout in one glance, the spatial organization and the architectural features of the environment are an important source of information for visitors in order to find their way.\(^5\)

The difficulty of wayfinding lies thus in the relevant information which is obtained by the user. The environment is the source of information. Dogu (2000) describes in his paper about ‘spatial factors affecting wayfinding and orientation’ that the environmental information can be divided into three categories:

1. Architectural information is contained or inherent in the built environment whether the user is in the building or outside. A building shape or layout may be difficult or easy to read. Nonetheless, even difficult buildings have a wealth of information present in their details: Stairs, lifts, corridors, doorways, and floor finishing are all landmarks used to determine the way to a given destination.\(^6\)
2. Graphic information may be further subdivided into general information about building tenants, directions to destinations in a building, and the identification of those destinations.
3. Verbal information includes the information that can be conveyed to passersby, security guards and occupants through the use of self-help telephones.\(^7\)

The focus of this research will lie on the architectural information, although the graphic information will also be shortly highlighted. The verbal information however can be less controlled by the building and the architect, and is therefore considered as less relevant to this research.
Although not the focus of this report, it cannot be denied that graphical information and use of signage benefits the ease of orientation and navigation. Maps, signposts and any other form of environmental information communication devices play an important role in orientation and navigation in unfamiliar environments. Therefore environmental graphic designers and architects need to work more closely to facilitate the ease of wayfinding within buildings. The roles of signage and architecture should be complementary to each other. According to Sims (1991) ‘...the addition of signs to an environment is not consistent with a lack of architectural integrity or design failure’. Designed in conjunction with architectural information. To the viewer it doesn’t matter where information comes from, as long as it is legible and readable.

These graphic communicators need to be facilitate the wayfinders with the right (up to date) information at the right time (when they need it) and the right place (where the need it). They should be well integrated with the architectural design to create a natural flow of information. According to Peponis et al. (1990) this is possible when the graphic information is well designed and placed at important facilities, key points or decision points. Graphic information has to be appropriately designed for environmental perception which consists out of the scanning and glancing process of the human eye. Which means that the signs must be designed and places with consistency; it helps the people to know where to look wherever they seem to be needing information in the scanning process. Differentiation from others signs and from the background with other functions helps to identify these signs in the stream of environmental information.

> Sign purposes

People need information for three things when they are finding their way through an unfamiliar environment. They need to know how the setting is organized or how to find out where they are in the building. Orientation signs have as purpose to help people orientate (1) themselves and give them information on which people can base their decisions upon. For the execution of decision people need directional information (2) to be guided towards their final destination. When they reached their goal, the destination needs to be identified (3) as being the goal the visitor was looking for. Communicating this information can through different types of graphic information.

13 Romedi Passini, wayfinding design, 1996, 232.
16 Ufuk Dogu and Feyzan Erkip, spatial Factors Affecting Wayfinding and Orientation, 2000, 736.
17 Ufuk Dogu and Feyzan Erkip, spatial Factors Affecting Wayfinding and Orientation, 2000, 736.
18 Ufuk Dogu and Feyzan Erkip, spatial Factors Affecting Wayfinding and Orientation, 2000, 736.
19 Ufuk Dogu and Feyzan Erkip, spatial Factors Affecting Wayfinding and Orientation, 2000, 736.
> **graphic information types**

Typographic information is based on letters and numbers. People need to be able to read the message, meaning that the must be able to read and to understand the language used. For effective communication, plain language is used. In order to avoid becoming lost in a building when we do not understand the language used in the signage, especially when there is a lot of 'visual noise' that distracts, we need to base the signage, not on language, but rather on symbols and universal pictographs. By using pictographics, which are symbols or icons of objects or activities, a message can be communicated through linguistics or literacy problems. These symbols represent reality, but are abstracted to extract the information in a fast and effective manner. However, unfamiliar signs still might some support or clarification by words to understand the message. Other sign types can be through cartographics, axonometrics or simplified plans which are abstracted representations of the reality.

Information has to be visually structured into small packages with a maximum of five or six messages, each of which can be picked up at a glance. By clustering information and knowing what to look for and where, will avoid a situation of information overload.

>> **communicating content**

The information on signs should structured according to content, that is, the relative importance in the decision-making hierarchy: higher-order or behavioral. Is the information suitable for the creation of an overview map or a sequential map. As signs can explain a whole decision plan along a route or it contains only the basic indications to develop a decision plan. Problems to avoid within the signage systems are conflict with other information, lack of information, inaccuracy or ambiguity.

**architectural information**

The perception of the built human made environment differs from the natural environment. The built environment is more regulated with basic measurements, straight lines and right angles than the chaotic natural environment. The presence of more curved, irregular, and asymmetric shapes in natural environment gives them a greater visual complexity in one sense, but at some point, this creates visual homogeneity as compared to the more minimalist character of built environments. The built environment lacks variation to an extreme degree.

The main goal of the environment is communicate the principle of its spatial organization to its users. By identifying spatial clues of the environment we should be able to the intent of the environment and to understand the principle of the spatial organization so that we can act on it. Architectural elements define spaces and communicates relations among spaces is wayfinding information which we need as wayfinders. Often the problems in wayfinding are an architectural problem. If the layout is too complex and confusing, signage has to help to solve the problem of disorientation created by the building. The term *architectural legibility* can be defined as an indicator for wayfinding performance, because how we perceive the building is one of our main sources of environmental information.
There are two definitions involved in processing of the environment: legibility and imageability. These respectively influenced by the environment and the human mind. The term imageability described by Lynch which can be defined as 'the ease with which a place is spatially comprehended and mentally represented'. Legibility can be defined as 'the ease with which environmental information is obtained and understood'.

If an environment has a high legibility factor it means that particular environment lends it good for extracting and comprehending the relevant information. A place that facilitates obtaining and understanding of environmental information and where the different elements can be recognized and organized into a coherent pattern has a high legibility factor. The legibility of architecture is an important issue within the design process. It influences the quality and the amount of information which can be obtained by the user. While imageability is a factor which comes from reenacting a mental representation and thus from the human mind, legibility is more related with the environment itself; it defines the quality and clarity of environmental information. The quality of legibility has to be a prerequisite of an imageable image. A labyrinth is for example legible, but less imageable. We can perceive the corners, but we will not be able to reproduce an accurate map of the maze we walk through. The legibility leading to a cognitive map with accurate spatial relations within a building will improve the imageability and therefore the wayfinding performances within the building.

Architectural legibility is the degree to which the designed features of the environment aid people in creating an effective mental image or "cognitive map" of the spatial relationships within a building, and the subsequent ease of wayfinding within the environment.
Weisman identified four environmental variables that have influence on the ease of orientation and wayfinding: visual access, architectural differentiation, layout simplicity and the use of signage.

- **Visual access**: A variable which can increase the degree of legibility is the visibility or visual exposure of an object. Through the visual access of environmental clues and the human ability to perceive these distant cues, more environmental information can be perceived and wayfinding tasks can be simplified.

- **Architectural differentiation**: How we can distinguish architectural elements or building parts from each other. If we can distinguish different parts from each other, it will help us to group certain elements and thus structure our perception of the environment making decision making and identification easier. The articulation and uniqueness of the different parts is an important theme in this factor. These different elements need to be sufficiently be differentiated, so that they can be easily distinguished from each other and from the background.

- **Layout simplicity**: The layout has to be understood through the articulation. The degree of simplicity or complexity translates itself in the number of rooms and corridors and their relation to each other. Thus the complexity of the configuration influence with ease people can grasp the overall layout and navigate through an environment: a more complex layout will make navigating more difficult. The layout controls the vector which guide the traveler to the destination. By giving a clear sense of direction and establish a visible and easy identifiable connection; the spatial relations can be understood with much more ease. The amount of direction changes will have a negative effect on the accuracy of route followed as the hum and can only store three to four items in the short term memory.

- **Use of signage**: The use of graphic information to provide the wayfinder with the required information is the fourth element. This element is, although an essential part of the information people need to find their way, the signage should therefore always be designed in combination with the architecture.
articulating the organization

Within the task of legibility we can distinguish two separate entities: organization and articulation. The organization is the structure of the building and the functional allocations of spaces; the organizing elements of the building which makes it able to function. The elements can only work if they are communicated as they were intended by the architect. The articulation makes sure that we, through our perception, can understand the organization of the building. It depends more on how different atmospheres gets articulated and communicate the differences between spaces by which we know what is what. The goal of the articulation is to communicate the building’s organization. The degree of comprehension of the articulation of the organization determines the legibility. If we cannot grasp the articulation, we will not be able to understand the organization. Patrik Schumacher, partner at Zaha Hadid Architects, defines the articulation as ‘the conscious design effort towards increasing legibility’. Within this effort a communication needs to be made towards a generic audience which recognizes and understands this effort of communication. The attention level and perspective is more likely to be more positive once the intention of the communication is recognized. The effect of understanding an object is an important factor in our cognition; people experience a form of pleasure, when they accomplish a recognition process. This legibility helps to read the articulation in order to understand what the organization tries to communicate.

According to Patrik Schumacher, within the articulation there are two separate dimensions can be distinguished; a phenomenological and a semiotic value. These two aspects address different tasks of articulation that are both equally important for the functionality of architecture. The one is addressing the perception of spatial order and the other is the comprehension of social order. The phenomenological dimension deals more with the manner the perception of the architecture’s spatial organization, while the symbiotic gives looks for recognizable symbols to give meaning to. In the end we need both dimensions working next to each other to make the architecture legible and functional: for the people to perceive the spatial order and to comprehend the social order of the building.

Within the properties of phenomenology Schumacher identifies two different methods: a bottom-up method, as in the Gestalt grouping principles or according a top-down basis, based on the basis of prior schemata and mental maps. These schemata, like axis, grids, concentric organizations etc, are abstract and thus open to novel interpretation. Articulation in this pre-semantic domain has to facilitate perception by means of visual clarification in terms of general criteria of perceptibility and conspicuity, as have been elaborated by the Gestalt psychologists in the early 20th century.
light | the visibility of our environment depends on an adequate level of light. That’s why effective settings for human events are defined by the amount of (day) light. Orientation and people’s emotional state is influenced by light. Light can be a powerful architectural characteristics in the environment which helps people to find their way.

“People are by nature phototropic – they move toward light, and, when stationary orient themselves toward the light. As a result the much loved and much used places in buildings, where the most things happens, are places like window seats, verandas, fireside corners, trellised arbors; all of them defined by non-uniformities in light, and all of them allowing the people who are in them to orient themselves toward the light.”

Tapestry of light and dark allows people to define different places in the building. Key points in circulation systems should therefore be on places which are lighter then other places. People will automatically be more attracted to these places. But be aware that harsh transition have a blinding effect which can disorientate people. By increasing the contrast in light so that is clear which places are important (in the circulation system) the architectural environment gives cues to people where important places are.

>> organization
Buildings are nested environments where local and global levels run through each other but keep a certain coherence. This reflects itselfs in the cognitive map of the building. We prioritize certain features and objects in the environment. Depending on the appropriate scale we use a certain subset of landmarks to orientate ourselves. It is essential for the visitor to detect the organization system of the building (part). Different typologies of circulation systems can be defined which can be used as a base for path networks:

Also different other patterns based on circulation patterns and wayfinding types can be used.

There are certain principles which can help to structure complex settings. Three information-structuring factors which are complement to Lynch’s elements for structuring the basic elements into a coherent spatial whole: spatial organization, spatial enclosure and spatial correspondence. Problems in making a coherent image, arose from difficulties in grasping these three factors.

spatial organization | The way the building is internally organized; it is responsible for the spatial arrangement of the spaces and architectural elements. With the five Lynch’s five elements as building blocks it is establishing an order from within the building. This determines how the cognitive map is organized. First we have to identify the organization principle to be able to structure and make sense of the acquired environmental information. With the perception of an organizing principle we establish a rule by which to retrieve that information we are able to reduce the amount of information. Interpreting the organization principle of the building is one of the most important factor in facilitating a good development of a building’s cognitive map. The amount of environmental references which confirm this principle is therefore of great importance.
The possibility of multiple interpretations of the same spatial arrangement can lead to distortions as it might be interpreted in a wrong way. If the wayfinder has established an organization principle they will distort the map to be able to fit the new information in. When this is the case the cognitive map will be weak, disjointed and distorted due to an incorrect organization principle. The organization principle is thus predominant and everything that does not fit this organization will get extra attention. Hierarchical structure organize from public to private. Level of privacy can be expressed by width of street, use, general atmosphere or ceiling height.

**spatial enclosure** | When spatial organization orders the setting from within, spatial enclosure does this from the outside. It is responsible in how the external organization principle is understood from the outside. It is involved with the perception of the building as a form, volumes and object. It tells use how it is accessible and express its content. "This representation is also simple and easy to retain. It is this object-image that, after all, comes to mind first in thinking about a particular three dimensional setting." The building form is one of the dominant factors people remember from a building.

The exterior form of the building has also a considerable amount of influence on the cognitive map. The building provide in just a glance a general frame for the structure inside by its expression and architectural composition so people are able to predict the functions and spaces within the building. By implying a organization principle, spatial enclosure provides a relation between the outer form and the interior organisation.

**spatial correspondence** | Spatial correspondence makes sure that there is continuity within the cognitive map of environmental characteristics and spaces within a setting and among settings. It avoids gaps in the cognitive map and establish relationships among spaces through articulation or by making it visible accessible; it integrates different mental views together to represent the spatial ensemble as one entity. "Spatial correspondence summarizes the environmental characteristics that facilitate the development of comprehensive cognitive maps reflecting the continuity of space." A lack of spatial correspondence can create big gaps and major distortion within a cognitive map.
Research pointed out that people assume that the organization of a floor is the same on all the floors. It also showed that people encounter difficulty in orientation when this assumption does not align with the reality. Special attention goes to the border between ground–underground, inside–outside and within enclaves:

- **Ground and underground** | If there is no visual relations between two levels, then two separate images will be developed.

- **Enclaves** | If a buildings are only accessible in separate parts: it will lead to disconnected images with a generally confused cognitive map as result. Also a strong barrier can lead to a discontinuous map.

- **Inside and outside** | Greater accuracy for destinations within the building than for those outside. Spaces at the building level and city level exist as two nonrelated entities. Only when passed through the doors or had visual access to prominent parts of the city, this is reduced.

> **Complexity**

However, a high degree legibility is not a guarantee for a good building. According to Passini ‘an interesting setting is more imageable than a dull, monotonous one. Curiosity is more stimulating to the cognitive abilities than boredom.’ This notion of the attractiveness of interesting environments has been confirmed by research of Derk de Jonge (1962) which found that people seemed to like illegible environments. While Kaplan and Kaplan (1982) noticed that people appreciate ‘surprise’ and ‘mystery’ in the environment. The degree of what is complex, is however questionable. ‘A more articulated space, broken up into more different parts, is generally more complex, though the way the different parts are organized is critical.’ The task of the designer is to create an environment which is stimulating and interesting enough to prevent a not sensational environmental experience, but legible enough to avoid frustration of not being unable to use it.

If we look for at example at the Museum aan de Stroom in Antwerp; the distinction of public spaces and private spaces is already clear while approaching the building. In addition, it also gives a hint of how the circulation system works. The difference in material, ornamentation and conceptual clarity of the façade allows people to extract some useful information about the building is works, before even enter the building. The lack of identity of each floor, will make it hard to know on which floor you are.
We need to collect environmental information to communicate specific information in order to have enough accurate information to base our decisions upon. This information can have specific forms: architectural, graphic and verbal information.

Graphic information is a vital part of the information the environment can provide. It needs to be designed in conjunction with the architectural design. We can identify different sign purposes; information on which the visitor can orientate themselves, know which direction to go to and identify the destination.

Architectural information comes in the form of how the building can be read. The degree of legibility determines how easy it is to extract environmental information from the building. Visibility of a building, the vision of our eye and Gestalt-grouping principles become decisive factors in collecting information. We need to see how the organization of building is articulated through the architectural elements. The organization of building will be used to structure the mental map.

Selecting the necessary information is an important factor in the collection of information. The information must be sufficient and relevant, but not too much. Too much information can cause information overload. The moment of when the information presents itself to the user is also crucial. People tend to store information when they need it.

Jerry Weisman found through research that some variables will make it easier to find your way through a building. These variables are visual access, architectural differentiation, layout simplicity and the use of signage.

77 Romedi Passini, Wayfinding in architecture, 1992, 128.
78 Romedi Passini, Wayfinding in architecture, 1992, 128.
80 Romedi Passini, Wayfinding in architecture, 1992, 111.
testing the theory

07 | emperic research

methodology 65
hypothesis 65
result 66
conclusion 70
discussion 71
To see how these experiences relate to the established theory, a small empiric research has been conducted. The different building accommodates different users, which use different strategies based on their environmental knowledge. Which sort of mental representations do they use to navigate through the building? How do they construct their cognitive map?

After the methodology [a] is explained, a hypothesis [b], based on the wayfinding theory, is made. The results [c] are analysed and compared with the hypothesis in the conclusion [d]. Within the discussion [e] the research is reflected and loose ends are discussed.
When the old faculty of Architecture burnt down in 2008, a new building for the faculty had to be found. The solution was found in the renovation the old chemistry building on the Julianalaan and upgrading it by adding two glass houses. The whole building is structured on ‘the street’ which is the axis which connects all the important function. Because of the spider like spatial layout it is sometimes hard to find your way in the building, but particular parts of the building are quite dominant in a cognitive map and helps to people find their way. Nevertheless, for a lot of visitors it is quite a challenge to find your way. Can the findings in the theory be found and confirmed in practice?
> **methodology**

Hypotheses are made based on what can be expected according the theory. The criteria to test the results derive thus directly from the recommendations. 25 people were asked in the hallway to fill in a questionnaire (see appendix) about that building. People were asked about their purpose of visit, their understanding and the level of knowledge of the building. This was done to establish an user profile which can be combined with the map of the ground floor people were asked to draw. This has to be done from memory, so it the map would be a good representation of the cognitive map people have of the building.

By connecting this profile to a mental map, the recording of the different mental maps can tell us how people store the environmental information of the building and which building components people use to structure their map. Therefore not a particular route has been asked, because the different routes can harder be compared. Asked is how the building is structured, so it can be used to plan alternative routes if necessary.

> **hypothesis**

The building’s concept is based on an interior street which runs from one side to the other side of the building. Important supportive functions and main spaces, like the glass houses, are situated along this route. The hypothesis for BK City is that this will form the main axis where the cognitive map will be structured upon. The different atmospheres of particular spaces, like the restaurant and the possibilities to enter the building will presumably form also strong anchor points. The many corners of the spider like structure will be however much harder to regenerate from memory.
results

The result of the empirical research is shown here below. By connecting the questions like frequency and purpose of visit specific relations are found.

As clearly evident in the graph, the intent of the visit is daily, with a small percentage which visit the building for one specific function. By looking at the amount of visits we can safely conclude that the questioned people are visiting the building on a highly regular basis and can thus be labeled with the purpose of commute. The function of the building makes clear why the purpose of the average visitor is a commute. As a school the people who work and study there, visit the building daily and have visited the building thus multiple times.

Familiarity with the building, the level of knowledge and the understanding of the building’s layout are displayed in the graph ‘familiarity’. Notable is the fact that the understanding of the layout lower valued is then the level of knowledge. Apparently the layout is a difficult characteristic in the building.

There is no dominant factor of the organization perceived by the people which results in an unclear description of what factor structures the building as they are not able to actively mention it. When people where asked what the most important factor was for the structure of the building, the answer was ambiguous. None of three possible answers was mention more than the other. This means that there isn’t one obvious factor that structures the cognitive map of the visitor.
In the representation of the cognitive map people were asked to draw the floor plan of the building form memory and to mention the three important elements. In the graph ‘important elements’ these elements are sorted on the number of respondents. The most mentioned elements are the glass houses and the ketelhuis. Mention of the differentiation of the two sides of the building stands out as they are not specific elements but an entire parts of the building. From all of the elements the districts is the one which is mention the most, paths and nodes follows on a big distance.
When all the elements are put back on the map and an attempt to create a shared cognitive map is made. A striking aspect is that are all situated along the ‘street’ and towards the boil house from the main entrance.
Districts are a dominant element within the cognitive map. Especially the glass houses, the boil house and the temple are among of the important districts. This dominant position is determined by its function, its size, its unique identity from other spaces, visual access or spatial distinct position. In the building’s outside image, the water tower is a distinctive elements, but is barely mentioned in the image. This is due to a lack of spatial correspondence.

The intent of the architect as a street which function as a spine which connects the most important function can be reconised within the cognitive map. The internal street which runs horizontally is this the spine which is also separate mentioned and is used a structuring element as it is used in every images to lay out the length of the building.

If we look at the different cognitive maps there are certain aspects that can be repeatedly found in different cognitive maps of the building.

>> the middle of the building is used as center | the middle of the building is used as center with east and west on either sides. This is a feature what came back in most of the maps. Some especially mention the differentiation of east and west. All maps have the center area with the main entrance centered.

>> building form is simplified | The ends of the building parts are neglected. This differs in some maps as the bigger parts as smaller extensions which are missing in almost every map. Apparently the change in direction is not big enough to be recorded. The amount of corners tends to be problematique as they pile up; it is at the ends that these corners are missing. Edges between districts are neglected and spaces are drawn as a continous spaces.

>> structure, identity and meaning | In this map the structure the building is clear; all maps use this structure of different corners. On these lines different anchor points are created depended on the meaning or identity of the places.
**unconnected building(parts) are tend to be forgotten** | the bouwpub with a special function is forgotten in almost half of the cognitive maps. This little building is not connected with the main building and therefore easy to forget.

**distortions arise through symmetry** | Due to symmetry we use to store the buildings plan, the east wing drawn shorter then it is in reality. This is one of Gestalt principles used by the human mind make to manipulate the plans to store it with more ease.

**imported elements are projected bigger** | Parts with an important function as the Berlage rooms as bigger projected then they are in reality. This reflects on the theory that import elements as anchor points dominate the map.
> **conclusion**

The expectancy of the interior street being the main structuring element seemed a bit exaggerated as the street is not that dominant in the maps. The differentiated glass houses are the elements which are structuring the map. Districts are mentioned a great number of times above the internal street. The differentiation as a whole gives them a strong identity will allow them to be an important factor. Although the layout was expected to be difficult, the overview maps were quite accurately representing the actual floor plan. Presumably the turns within the building are such major changes, that they are recorded.

Different features, described in the theoretical framework, such as the use of symmetry and simplification, can be found in these cognitive maps. Obviously not all of the described processes were found back in the cognitive map, but not all of these can be used in one building. But the features that were found, were confirmed.
discussion

The order in which the cognitive maps are drawn tells something about which characteristics are important for the development of the mental representation. Which features determines how the cognitive map is built up.

The surveyed people were asked to draw a overview map of the ground floor. But what instead a specific route was asked. The same elements are on the same route and based on what people mentioned or didn’t mentioned, it can becomes clear which characteristics people prefer in their wayfinding process.

The first time someone visits a building is by far the most interesting aspect. If they never visit the building, the visitor should be guided and then asked to draw what they have seen.
design patterns

08 | design task

support wayfinding task 74
articulating the building’s organization 74
design patterns 75

09 | design principles

influential factors 76
> support wayfinding capabilities of the person 76
> acquiring a cognitive map 78
> evoke a strong cognitive map 80
> communicate the intent of the environment 82
elements 85
> path 85
> nodes 86
> districts 87
> edges 88
> landmarks 89
support wayfinding task 90
> orientation 90
> identification 92
> navigation 94
overview 96

10 | application

design process 100
> organization 101
> articulation 103
> applying the principles 106
> designing the elements 108
> environmental characteristics 110
design tools 112
> uses 112
> characteristics 112
Now the theory has been explained the focus will now turn towards the design patterns. The problem with the current body of literature is that it does not tell anything when and where to apply different principles in the design process. Wayfinding information is only efficient when it represents itself at the moment the user needs certain information to make a decision. The recommendations will therefore lay out when certain wayfinding objectives can be applied on which part of the route and which specific elements and characteristics can be used to communicate what the user needs to know to make a decision.

Chapter 8 frames what we should demand from the design patterns [a] and how these are built up. Building forth on the theoretical framework, the recommendation part [b] will describe how the design decisions can influence the wayfinding performance of an environment, which includes the wayfinding objectives [d], the influential factors [e] and area of implementation [f]. In the application part [c] the differentiation between organization and articulation allows the application [g] of the recommendations with the design tools [h]. By focusing on the questions of where and with what, the recommendations can be applied with much more ease.
It is difficult to translate wayfinding design in specific design recommendations due to particular program, users and location. Therefore a wayfinding approach with generic recommendations is proposed which considers how the information processed, stored and used. This approach forms a framework in which design recommendations can be implemented if the designer sees fit.

**Support wayfinding task**

Above all there is a main objective in which the building should provide. The visitors of the building should be able to perform the wayfinding task set in the theoretical framework; be able to orientate themselves, identify the destination and actually finding their way towards the destination. The design has to facilitate the information people need to accomplish a good navigation towards the desired destination. This has to be done without too much effort and fatigue of the cognitive processes. The architect should therefore match the complexity of the architecture with the wayfinding capacities and needs of the user. All this will allow a satisfying wayfinding experience through the environment. Successful wayfinding design allows people to (1) determine their location within a setting; (2) determine their destination; (3) develop a plan to take them from their location to their destination; and (4) execute the plan and negotiate any required changes.

Architectural design which supports solving the wayfinding task should be able to (A) identify and mark spaces; (B) group spaces; (C) link and organize spaces; and (D) communicate this information to the user. It should be concerned for the first-time visitor, because visitors will, through familiarity, act on the already obtained environmental knowledge.

**Articulating the building’s organization**

An important aspect of wayfinding is the understand the spatial configurations and our position within it, so we can use this information to act on it, while we navigate through the building. The design challenge is to make a building that can communicate its organization towards the wayfinder through the articulation of environmental cues. By doing this well, visitors should be able to navigate and find their way through a complex organization. Wayfinding design is therefore not concerned to make the building as logic as possible, but to make ‘architecturally interesting, wayfinding efficient buildings that are well articulated.’ The wayfinding criteria should not act as constraints but should stimulate the designer to look for innovative design solutions, where all the preconditions are merged together.
design patterns

This research will function as a catalogue of design recommendations which has to increase wayfinding performances in architectural designs. This recommendations or patterns are tested in an actual architectural design of a big public building. The goal is to illustrate most of the recommendations with the result of this design. Wayfinding recommendations unfolded:

> support wayfinding task - why? | the environment should be able facilitate to accomplish the wayfinding task: let people orientate and navigate in the environment and identify the destination.

> influential factors – how? | the personal abilities and the environment has to ensure the acquiring and the evoking of a strong accurate cognitive map. This can be done in various way to accomplish the three wayfinding objectives.

> area’s [elements] – where? | area’s on the organizational level, defined by the elements of Kevin Lynch, which are of important for user during a wayfinding process will highlighted and articulated. These are the area’s where the architect can operate.

> components [elements] – where? | specific elements in the articulation level which are defined by Kevin Lynch that are present in a particular area, which can be used to communicate specific objectives by the use of different principles and characteristics. The elements are the visible communication devices.

> design tools – with what? | a principle of how something is structured can create a powerful message to the user. It is the question how the architect uses the elements. These principles can use different characteristics which are defined by the properties of an element that can communicate information.

---

1 Romedi Passini, Wayfinding in architecture (New York: Van Nostrand Reinhold, 1992), 164 (check voor letterlijk quote)
3 Susan Hunter, ‘spatial orientation, environmental perception and wayfinding’ in design resources DR-14 (center for inclusive design and environmental access, 2010): 1.
An important element is how the organization is articulated and how that information is received and processed. Within that frame there are certain factors and objectives which need to be taken into account. Three influential factors determine the ability for the wayfinder to complete the wayfinding task. As a product of the person and the environment the cognitive map is divided in two parts. Articulation and organization divides these factors in four different categories.

**influential factors**

| support wayfinding capabilities of the person |
| person - articulation |

**use decision points**

> be careful with the amount of decision someone have to make at a decision point.

A decision plan is based on a route where people make small subsets of decisions. Because the human mind is limited in recording unstructured information, as its only able to store three to four items of information in the short term memory.

> the environment should provide the necessary cues at decision points

'Any breaks in transportation – nodes, decision points – are places of intensified perception.'

Distinctive features along a continuous route will therefore not be remembered as clearly when the same features happens at decisions points.

**consider the visual field**

> be aware of the human visual field | The human visual field is 54 degrees wide, 27 degrees up and 10 degrees down. The field of view and the field of vision influences the measurement of size. Watch for critical distances and the obstruction by structural and decorative elements.

> consider the scanning and glancing process; be consistent in placing elements or information and using particular characteristics | the viewer will see the same features through the different images and is able with the Gestalt principle to discover a pattern or organization. Architectural elements should show design features placed in consistent and predictable locations, allowing the user to learn what to look for.

By placing information consistently on the same place the wayfinder will learn where to look for information.
> design with light

- **use light as an orientation point** | people are by nature phototropic – they move toward light and when stationary, orient themselves toward the light.
- **place important places at spaces with more light** | human events are defined by the amount of (day) light. Key points in circulation systems should therefore be on places which are lighter than other places. The tapestry of light and dark allows people to define different places in the building.

> grouping the information

- **use gestalt principle to communicate the structure** | The gestalt theory is involved in decomposing a complex scene and grouping elements together. It helps to characterize the spatial relationships within an environment and recreate them mentally in a cognitive map. These different elements need to be sufficiently be differentiated from each other, so that they can be easily be distinguished from each other and from the background.

The five major Gestalt-grouping principles are
- the law of proximity (we group the elements which are closest to each other),
- the law of similarity (we group the elements which are similar to each other),
- the law of continuation (we group elements on basis of smooth continuation),
- the law of closure (we prefer closed forms, so we decompose images to have closed forms) and
- the law of symmetry (we prefer symmetrical figures, so we decompose image to have symmetry).

> information selection

- **create a potential decision plan for each user group** | As architects we must provide the right amount of environmental information at the right time. The amount and quality of the information influences the wayfinding performance and the accuracy of the cognitive map. A decision plan enables the architect to know where decision need to made.

- **avoid information overload** | We need to strip the noise of unnecessary information to communicate a clear message. Within the building the architect should supply accurate and relevant information.

---

provide imageability

the degree how easy different parts out of the environment can be selected and structured to be able to form a coherent pattern. Be aware of how people assemble their mental image; the time and movement through space which through which the articulation of the environment is perceived.

give places an identity

Distinction between area’s or elements helps to separate the different entities in the mental map. By giving them their own distinct identity, that place or element will function as a (dominant) mental anchor point within the cognitive map. Place characteristics are connected to a set of behaviours and creates an expectancy to find particular elements. Distinctive views of environmental characteristics, unexpected changes and strong contrast in the building will help wayfinders to construct a wider cognitive map.  

However, too many distinctive features makes it harder to establish an identity. This happens when there are more than three elements of the same appearance. If no clear identity is present, then people tend to pay attention to smaller distinct details. This can be less reliable as smaller features are not always good to spot.

Gaps of identity in the environment, although physically close together, can cause larger gaps within the cognitive map.

cognitive maps need a structure

The way a cognitive map is built up is determined by how the information is structured and which elements in the environment are considered as the most dominant. Depending on the type of environment and the predominance of particular elements we use different structures.

avoid ambiguity | if people think they identified a principle, they will structure their mental image according this principle. Major distortions will be created to fit the information in the identified principle.

communicate a clear structure | if the structure is unclear and the environment furthermore no clear distinctions are visible, people will concentrate more on details and isolated or poorly visible landmarks, which are harder to control as a designer.

According to Lynch’s (1960) research most observers grouped their elements into groups which are interdependent and have strong relations with each other.
create places with meaning

People create mental anchor points at places which has meaning to them. By endowing places with meaning of animating them, and of stimulating the active involvement of the participants this anchor point will even be stronger.

Use the design to reinforce already existing social meaning, not to negate it.16

The characteristics of the built environment are memorable in the environmental cognition and should therefore play a dominant role within the design.

(1) the form of the building; its size, contours, complexity of shape, and uniqueness of architectural style. Imageability or distinctiveness of form

(2) visibility and access; pedestrian access and the possibility of moving around the building.

(3) use; if a building had an important function and was used often, it was also well remembered.

(4) symbolic significance; significance of a building’s role in society17

be aware of the development of a cognitive map

make sure that there are enough landmarks to create mental anchor points

create one central route which easily allows a sequential map

allow branches along the central route to construct an overview map

be aware of distortions people make in their cognitive map

People have a preference for simplified and articulated elements which can be easily mentally stored.18

These objects, distances and relations are manipulated in the representation to satisfy the human perceptual needs so that they are able to store it.

simplification | people tend to store the representations as simple as possible. closure, conciseness, symmetry.

accentuation | people tend to overemphasize particular parts, characteristics or special elements in their environment.

distortion | objects are joined or rotated in the cognitive map, while this was not the case in reality.

distances between important places are bigger projected and are more dominant in the cognitive map

distances tend to be longer when it has more distinctive features that form mental anchor points along that route.19

distances to places that are more appreciated, seems to be shorter in relative distance then places who are disliked.

due to a clustering effect in mental representation two places in the same district seems to be closer to each other than places in two different districts.20

19 Maarten van Zutphen, ‘Can you show me the way to Newmarket?’, (Dublin: University College Dublin, 2012)
20 Maarten van Zutphen, ‘Can you show me the way to Newmarket?’, 2012
spatial organization

The way the building is organized is one of the most important factors to structure the cognitive map upon. People should be able to identify the spatial arrangement of spaces and architectural elements as a pattern and understand this organization. This determines how the cognitive map is structured: it establishes a rule by which to retrieve and make sense of environmental information we are able to reduce the amount of information.

> the designer should make sure that the organization principle of the spatial arrangement is easy and fast detectable and comprehensible.

> make sure that the circulation system doesn’t allow ambiguity or confusing options.

If people think they identified a principle, they will structure their mental image according this principle. Major distortions will be created to fit the information in the identified principle. The organization principle should makes sure that the information is structured in one specific way.

> keep an organization relative simple so it easy to grasp | Be careful with the amount of edges. They are used to follow the vector which guide the traveler to the destination. The amount of direction changes will have a negative effect on the accuracy of route followed.

> the organization principle is thus predominant and everything that does not fit this organization will get extra attention.

By using the organization principle in a consistent and hierarchical manner the change of the organization will be understood will increase.

> create a hierarchical structure organize from public to private | Within the organization of the building we can identify a nested system of different realms. It can be broken down as a complex of visible smaller buildings/parts; it has to manifestate its social facts of the situation. By creating tendencies of privacy people can be known what is public and what not. Levels of privacy can expressed by width of street, use, general atmosphere or ceiling height.

> avoid an unclear structures

If the structure is unclear and the environment furthermore no clear distinctions are visible, people will concentrate more on details and poorly visible landmarks, which are harder to control as a designer.

spatial correspondence

The articulation of spaces and visual accessibility should allow continuity between major parts of the setting and the setting in its wider environmental context. Spatial correspondence makes sure that there is continuity within the cognitive map of environmental characteristics and spaces within a setting and among settings. It avoids gaps in the cognitive map and establish relationships among spaces through articulation or by making it visible accessible. A lack of spatial correspondence can create big gaps and major distortions within a cognitive map.
anticipate on the expectancy people have for different floors | with knowledge of one floor people make assumptions about what to expect on other floors. Create spatial correspondence or orientation points on which the wayfinder can rely as he continues its way on other floors. People encounter difficulty in orientation when this assumption does not align with the reality.10

avoid the making of gaps in the cognitive map
If there is little spatial relationships between different building parts (different floors or rooms), then the viewer will have a hard time linking the particular sets of images together. After a major change in the environment, the continuity in the map remains important. The viewer will adjust his image to secular shifts in the physical reality around him.30

Special attention goes to the border between ground–underground, inside–outside and within enclaves:

Ground and underground | If there is no visual relations between two levels, then two separate images will be developed.21

Enclaves | If a buildings are only accessible in separate parts: it will lead to disconnected images with a generally confused cognitive map as result. Also a strong barrier can lead to a discontinuous map.33

Inside and outside | Greater accuracy for destinations within the building than for those outside. Spaces at the building level and city level exist as two nonrelated entities. Only when passed through the doors or had visual access to prominent parts of the city, this is reduced.34

Create entrances to major destinations, and landmarks.

spatial enclosure
Spatial enclosure can tell the wayfinder how the organization is enclosed. The building form provides cues about the organization, so that an expectation can be made of the internal structure of the building.

the building volume should express its content and internal general organization | By implying a organization principle, spatial enclosure provides a relation between the outer form and the interior organization.26 Try to come to an enclosure that is as distinct as possible.36

make sure that the building form expresses its accessibility | The form of the enclosure has to be made visually accessible from the major approaches to the setting.27 The building should express externally how it the building is structured.

avoid a misalignment with the internal organization | Buildings from which the exterior does not correspond with the interior organization principle or which are ambiguous lead to poorer mental representations.38
**communicate the intent of the environment**

*environment - articulation*

>> **create a legible environment** | Legibility can be defined as ‘the ease with which environmental information is obtained and understood’. A place that facilitates obtaining and understanding of environmental information and where the different elements can be recognized and organized into a coherent pattern has a high legibility factor.

<table>
<thead>
<tr>
<th>keep the layout relative simple</th>
</tr>
</thead>
</table>
| It is essential for the visitor to detect the organization system of the building (part). The complexity of the configuration influence with ease people can grasp the overall layout and navigate through an environment. Layout simplicity translates itself in the number of rooms and corridors and their relation to each other.

>> **a simple layout is easier perceived through articulation** | the organization can be achieved in different ways, by giving a clear sense of direction and establish a visible and easy identifiable connection; the spatial relations can be understood with much more ease. Place connecting corridors at acute or obtuse angles.

>> **Provide the user with an ordered possibility of choice at decision points** | at decision points the user should be provided with clear possible choices with a source for more detailed information.

<table>
<thead>
<tr>
<th>create visual access</th>
</tr>
</thead>
</table>
| A variable which can increase the degree of legibility is the visibility or visual exposure of an object. A sharp and intense presentation to the stimuli is necessary to be recorded. The (relative) size of the object and the time of how long an object is visible are important characteristics.

>> **create visual access to the architectural differentiated spaces and elements** | Visual access to familiar elements, key locations or landmarks will improve orientation and enhance these relations. Through the visual access of these clues and the human ability to perceive these distant cues, more environmental information can be perceived and wayfinding tasks can be simplified.

>> **create visual access to the architectural elements needed for wayfinding** | make sure that the major architectural elements needed for wayfinding, such as stairs, elevators, entrances, and exits, are visually accessible form the key circulation routes.

>> **create an overview** | by providing the users with a visual overview of the surroundings, they can see a lot of elements with their relationships as their relations to the whole. Create panoramic overviews and voids which allows the user to get an overview of the spatial configuration which enhances the memorability.
The difference between a negative space and a positive space is how well it is defined. Negative space is shapeless, while positive space has a more distinct and definitive shape. It is a matter of the degree of enclosure and convexity. Convexity means that when you take two random points within the space, the line will always be completely in the space. Positive and (partly) enclosed spaces seems bounded and have clear boundaries. A negative non-convex has no clear boundaries.

>> be aware of lines of sight (horizontal and vertical)
Consider lines of sight towards the building and within the building. By considering the human visual field of 54 degrees wide and 37 degrees high, we have anticipate that the horizontal and vertical lines of sight are caught within this visual field.

| ensure architectural differentiation |
Architectural differentiation allows people to distinguish and therefore identify the different destinations, building parts, spaces or elements. By making them look unique, they can be easily be distinguished from each other and from the background. It will help us to group certain elements and thus structure our perception of the environment. Differentiation is also essential for identifying the options for decision making and for the creation of mental anchor points. It needs a certain identity by which we can distinguish them from other places. Articulated spaces and architectural elements, as well as objects furnishing the space, which are distinctive in terms of form and meaning can also serve as landmarks.

| use distinct features and be careful with uniformity and repetitive architectural features |
Contrast, distinctive views of plantings, water features, unexpected changes in scale or color, and strong contrasts of spatial configuration, materials, and landscaping assist users to construct wider mental maps. Avoid contradictory articulation of interior and exterior spaces, and numerous entrances undistinguished from one another.

| make sure that the major architectural elements pertaining to wayfinding are differentiated from the general background |
The paths and zones should stand out and are distinguished from each other to accentuate the major circulation system.

| communicate accessibility of space |
Articulate spaces and circulation routes (horizontal and vertical) so that it clearly communicate who has access: the public, the private user, or officials only. Exterior wayfinding obstacles as poor identification of building entrances and lack of clear access from the surroundings.

38 Romedi Passini, Wayfinding in architecture, 1992, 122.
40 Lynch defined legibility as "the ease with which [the city's] parts can be recognized and can be organized into a coherent pattern." (O'Neill)
| use signage |

Signs are graphic communicators need to be facilitate the wayfinders with the right (up to date) information at the right time (when they need it) and the right place (where the need it). Purposes of signs correspond with wayfinding task: help people to orientate, acquire directional information, and identify destinations. The graphic information should be well designed and placed at important facilities, key points or decision points.

>>> make the graphical information accessible | signs pertaining to wayfinding should be visually accessible from the relevant circulation routes. The messages should be sufficiently large to be read from a distance or at least from the decision point.  

>>> being consistent of the graphic display and placement helps the people to know where to look wherever they seem to be needing information in the scanning process. | Signs should be placed in consistent and predictable locations which allows for learning process and provide context. Signs should have consistent design features to be easily recognized. The system of directional signs should be continuous until the indicated destination is reached. This repetition of messages is needed, as people might miss some clues.

>>> avoid an excess of information overload | Consistency in design, placements and differentiation from the background or signs with other functions. As a rule of thumb, signs should for example not contain more than five or six messages. Information has to be visually structured into small packages, each of which can be picked up at a glance.

>>> be aware of the content of the signs | Information should be structured according to the relative importance in the decision-making hierarchy. It can explain a whole decision plan along a route or it contains only the basic indications to develop a decision plan. Signs should clearly communicate information for the part of process and for whom it is important. Problems to avoid within the signage systems are conflict with other information, lack of information and inaccuracy of the information.

>>> use symbols | we need to base the signage on symbols and universal pictographs. Be careful with the ambiguity of signs, as no information is preferable above wrong information.
elements

> path

Paths can be considered as the most important element as these are the lines of movement through we perceive the building. These lines of movement can be used for structure or orientated elements as people will also refer to other elements.\(^5\)

**\(\gg \) give visual dominance to differentiated pathways.**\(^6\) They are the main influence in forming cognitive map. The key paths should be well differentiated by an unique or a continuous quality to differentiate from the whole with different spaces, view and motion. “The path might be so shaped that the flow itself becomes sensuously evident: split lanes, ramps, and spiral would allow the traffic to indulge in self-contemplation.”\(^7\) Visual exposure of the path and/or its goals will heighten the differentiation of that route.

**\(\gg \) make series of (intermediate) goals and place them along point of interest** | If the path is differentiated so that the movement can be measured. People can use the anchor points as orientation points. Changes of characteristics along the path can give such an identity to a path.\(^8\) Destination of a path is the important aspect, we will have solved the wayfinding problem when we have reached the goal. Therefore paths should be perceived as something that goes somewhere.\(^9\)

**\(\gg \) Be aware of the process of walking** | People don’t walk straight to their destination, but uses sub-destination (decision plan) and cut corners. Consider line of motion benefits from a clarity of direction. Too many turns or strange curves can create major distortions in the cognitive map.\(^10\)

**\(\gg \) Place glimps of view at points of transitions; not in places they stay.** | In this way cues will be subtly be recorded by the observer.\(^11\) As the path reveals other elements while people are walking on it, then the wayfinding experience will be increased. The environment can also be used as an orientation point.

---

56 Paul Arthur and Romedi Passini, wayfinding; People, Signs, and Architecture, 1992, 180.
64 Kevin Lynch, Image of the city, 1960, 96.
node

A building needs activity nodes to generate a flow of people to survive. We have to “link activity nodes, place main points of attraction at the two ends to keep a constant movement up and down.” Making decision to find your way happens at the intersections of these different paths. By visualizing this clearly such an intersection become vivid in the mental image and create a strong anchor point.

> make nodes as strong anchor points | make sure that the node is differentiated from the environment, so it can be used as mental anchor points.

> keep nodes simple | paths should be recognized as one enter in clear joint, then decisions can be made fast. Coherent spatial forms which express the space helps by forming such a clear image. Make nodes defined as a place with sharp, closed boundaries. Break in transportation and decision points on path should coincide with node to receive more attention; so places one or two objects of attention in the middle to break the lines of movement. Joint of path and node must be visible and expressive. Traveler must able to see clearly how to enter node, where the break is, how he goes outward.

> make sure that the next node is visible | By arranging series of nodes related to the building’s form and structure the cognitive map: nodes are linked together by close juxtaposition or allowing to be inter visible. Concentration points organize large districts if presence signalized in surroundings. Make for example a sequence of sitting spaces. “lay out the entrances to form a family. This means (1) they form a group, are visible together, and each is visible from all the others. (2) They are broadly similar, for instance all porches, or all gates in a wall, or all marked by a similar kind of doorway” Gradient of characteristics leading up the node or visible from outside the node. If people can see where they are supposed to go to, it will avoid confusion.
Districts are areas of a homogeneous character, there are certain cues which are continuous in a district and discontinuous elsewhere. There is a small cluster of characteristics which are fixed characteristics in a district, while others characteristics varies. How more overlapping characteristics, how stronger the impression. “It appears that a “thematic unit” of three or four such characteristics is particularly useful in delimiting an area.” Make districts visible as a whole and shape them by its definiteness and closure of boundary. Create a strong contrast between spaces with for example change light, sound, direction, surface, level. Make districts distinctive

Create a hierarchy of districts by making different realms people can travel through a sequence of realms. If these realms are well differentiated the wayfinder can make mark a realm as a specific place. Each realm has its own main circulation space and the entrances of a realm opens to the circulation system of another realm. Districts can be structured within itself. “There may be sub-districts, internally differentiated while conforming to the whole; ... A structured region is likely to be a more vivid image.”

Communicate the hierarchy of public and private. Vary with the ceiling height to make people comfortable. A low ceiling will create intimacy, while a high ceiling propose a more formal setting. The proportions of the room as well as the social distance between people as the height corresponds to the horizontal dimension of the social situation. Variation within itself creates social relation. In the hierarchy of spaces you can use an intimacy gradient to arrange the spaces from public to private with different subtly social meanings. As you move further in the building the spaces become less public and more private which is articulated in the architecture. Offices spaces can be open to other people, but more private workspaces will be further in the back. In the front you place relatively more sitting places.

Be aware of the different area’s. Three different types of area’s can be identified: reaching major zones from the key access to the setting, reaching one zone from the other and reaching places within the zone. Major destination zones which correspond with the key wayfinding tasks should be identified. These destination zones can be articulated by functional, physical expression or general atmosphere to assure its identification.

---

70 Kevin Lynch, Image of the city, 1960, 103.
73 Kevin Lynch, Image of the city, 1960, 103.
74 Christopher Alexander, Pattern Language, 1977, 500.
75 Kevin Lynch, Image of the city, 1960, 104.
76 Christopher Alexander, Pattern Language, 1977, 552.
77 Christopher Alexander, Pattern Language, 1977, 484.
78 Christopher Alexander, Pattern Language, 1977, 473.
79 Kevin Lynch, Image of the city, 1960, 104.
80 Christopher Alexander, Pattern Language, 1977, 881.
81 Christopher Alexander, Pattern Language, 1977, 613.
82 Office: entry lobby, coffee and reception area, offices, workspaces, private lounge.
edge

Where there are districts there are edges or borders along or between them. Borders of an activity are better remembered if they correspond with a physical border. A gateway pinpoints the place where a path crosses a border, so you know that you enter or exit a district. Edge should bind but only differentiate an “inside-outside” sense. When districts are suitably differentiated it should express connections with other districts to make a penetrable border.

» create a continuation | Edges can create certain continuity through their length. They are better visible from a distance and form clear joins to bound two regions. Edge can be shaped to give orientation along length; gradient, identifiable points at interval, individualizing the ends.

» allow penetration | If an edge is not continuous; it should have definite termini/recognizable anchors to complete the line. Allow visual or motion penetration which are ‘structured to some depth with the regions on either side. It then becomes a seam rather than a barrier, a line of exchange along which two areas are sewn together.’ The barrier separates while the seam can also join with a low wall that can also be used as a bench. Consider the width, height and the ambiguity of a boundary.

By creating an overlap the edge can make softer. Public paths to the building which are covered by the building should be placed partly inside the building. An arcade with a low ceiling which is an extension of inside (only covered) with openings to the building will people draw in. Building edges should therefore be orientate the building towards the outside. People prefer being at the edges of open spaces. Make these place human; create little places with benches and open it to the street with a sight of action. Or let the activity is come out: so that you are literally going through the activity.

If an edge has many visual and circulation connections with the environment, then it can become a line on which people align their cognitive map upon.

» articulate entrances | Entrance can be seen as the transition which controls the movement between districts. While approaching the building you should be able to know where the entrance is; it should be visible when you make the decision to enter the building. Consider lines of approach as people will take a maximum detour of 50 feet. The entrance should be shaped so that it is visible and differentiated. Make it acute angled and visible when the entrance sticks out.

» connect the inside with outside space | An indoor space is less public then an outdoor space. There is also a difference between street and interior behavior. Increasing the numbers of entrances on the street to connect these different worlds and consider that the width should be higher than the height of the space. With a glass front outside space flows through the building which allows the people to make continuous connection between building and city.
> **landmark**

Dependent on the environment and personal preferences; landmark is a point of reference which can be an organizer of the mental map. Distinct features are selected from the environment to create initial anchor points. People use these landmarks to position other places close to that position. 

Central open space can be used as such a starting point as they give visual access to different floors.

>> **create a singularity** | a particular contrast with background. Its spatial prominence or distinctiveness is one of the major factors to attract attention. But clarity of a general form and richness of detail or texture will makes an element or building remarkable and invites the eye.

>> **Place landmarks on decision points along the route.** Research shows buildings are remember more on particular moments of decision then a continuous element along the route. Image strength rises if the location of the landmark coincides with concentration of association; ‘…if we are to make our environment meaningful, such a coincidence of association and imageability is necessary.’

>> **let landmarks differ in size** | landmarks don’t necessarily need to be a large object as location is crucial. A landmark of large size must allowed to be seen, while small landmark should articulate themselves within the zones with more perceptual attention (‘floor surfaces, or nearby facades at, or slightly below, eye-level’).

>> **create visual exposure** | the image of a landmark will be stronger when it is visible over extended range of time or distance. It may be useful to be able to distinguish direction of view. "If identifiable from near and far, while moving rapidly or slowly, by night or day, it then becomes a stable anchor for the perception of the complex and shifting urban world.” Single landmarks are considered as weaker references unless they are dominant in their environment.

---

85 Christopher Alexander, Pattern Language, 1977, 779.
86 Kevin Lynch, Image of the city, 1960, 104.
87 Kevin Lynch, Image of the city, 1960, 104.
88 Kevin Lynch, Image of the city, 1960, 100.
89 Christopher Alexander, Pattern Language, 1977, 1126.
90 Christopher Alexander, Pattern Language, 1977, 583.
91 Christopher Alexander, Pattern Language, 1977, 726.
92 Kevin Lynch, Image of the city, 1960, 100.
93 Christopher Alexander, Pattern Language, 1977, 544.
95 Christopher Alexander, Pattern Language, 1977, 430.
96 Christopher Alexander, Pattern Language, 1977, 430.
supporting wayfinding task

Along the route, the visitor continuously uses its wayfinding abilities to answer the necessary question of the wayfinding task. The environment suggests distinctions and relations of intended interpretation (design cues) and prescribed behavior, while the observer selects, organizes and gives meaning to what he sees. The environment should therefore be able to let the visitor (1) to orientate himself, (2) to let him know where to go and (3) to let him identify the destination. Orientation, identification and navigation are categories in the wayfinding task. Goals and explanations connected with the connecting means and aspects are displayed as a strict hierarchy.

> orientation

exposure, simplicity and definiteness

>> facilitate screening of a space

If people are able to get a good overview of a space, then they know where that space begins and ends. This defined space can help people to focus their attention on specific areas. In this way people are more able to acquire environmental information in a more efficient way, people know what parts of the space belongs to different parts of the space and therefore are aware of their freedom of movement.

make a defined space

> coherent spatial form
> closure of boundary
> sharpness of boundary
> foci of attention
> convex spaces

make joints clear

> high visibility of joints and seams
> clear relation and interconnection between elements

make a place visible as a whole

> create overview

>> let people know they are approaching a place

Environmental information about what kind of a place is coming, is very useful when you are trying to find your way through a building. This information can be used to avoid a specific place or to confirm you are on the right way towards something.

signalise the upcoming presence of a place

> gradient of elements
> visible from outside
> hint/clues

concentration of association

> densification of elements
>> let people know where they are on a path
If specific routes are laid out, then people can check whether they are still going towards the destination they planned to go to. Sense of progression and sense of motion can help to identify particular parts of a route. An accurate sense of knowing where you are helps with solving the wayfinding problem.

articulate path
- differentiate from the surroundings

create a sense of progression
- gradient of elements*
- densification of elements*
- differentiation of elements*
- tunneling of space

create a sense of motion
- dynamic shape

differentiate end and beginning
- one end from another
- one side from another
- one compass direction from another

>> let people be able to orientate themselves with a specific element
Orientation with a specific element, as we do when we use the strategy of piloting through an environment, can be useful to explore an unknown environment without becoming totally lost. Specific and consistent elements can also be used as mental anchor points to build a mental map upon.

make orientation points/area
- spatial prominence
- identifiable points
- individualizing ends
- consistency

>> use of signage
Orientation signs allow the visitor to be able to know where he is within the environment.

---

Identification

Identity, singularity and clustering

Let people be able to see where something is
Visual access towards specific parts of the building helps to create an understanding of the building in relation to how the building and her functions is structured. The knowledge of even an overall impression where something is, helps by creating a sense of direction and understanding the structure of the building.

Create visual exposure
- lines of sight
- transparencies
- central distribution area

Make clear how to enter/leave
- articulate (important)
- entrances
- differentiate entrance/exit

Let people be able to understand a form
Clarity of forms helps to establish a sense of satisfactions when people understand how forms are build up. If a form is too complex then this satisfaction can turn into disappointment, dissatisfaction and stress. There is however not a clear and defined border between those too, because a complex form can be interesting and appealing and thus can have a certain attractiveness.

Make easily distinguishable forms
- clarity
- simplicity
- limitation of parts

Let people be able to see the difference between elements
To be able to differentiate elements from each other helps by understanding what is what. This distinction between elements helps to structure our environment and helps us to focus more on specific information which we need to acquire to base our wayfinding decisions upon.

Make a clear contrast
- create differentiation between elements
- create differentiation between areas

Make joints clear
- high visibility of joints and seams
- clear relation and interconnection between elements

Give a place meaning
- social
- historical
- functional
- economical
- individual
**>> let people know which elements belong together**

Grouping of clustering of elements helps people to know what belongs together and allows to create a certain hierarchy in our mental image. This hierarchy helps us with divide the information we acquire out of the environment in different useable clusters of information.

- Nearness of parts
- Repetition of rhythmic interval
- Similarity
- Use common patterns

**>> let people focus their attention on an element**

By creating a focus on a specific element, the element will become more important than other elements. Such elements will also appear bigger on mental maps which people will have of an environment and can be used as orientation point or to articulate that their something happening at that place or point.

- Size
- Intensity
- Interest

**>> use of signage**

Identificational signs makes sure that an element can be marked as a specific element.
navigation
structure, hierarchy and relations

>> let people know how a connection is made
Information of how places are connected is essential for people which need to find their way in a building. It is the connections between places that allows us to go from the place of departure towards the desired destination.

directional differentiation

> create differentiation between elements*

>> let people understand how the building is structured
The way a building is build up and structured can tell something where to expect certain functions. If the system is consistent, then the visitor can be capable to even predict what is coming in area’s he is not yet familiar with.

create hierarchy

> sequence of privacy

create a clear structure

> scaled
> simplicity
> image paths
> sequence of distribution area’s

recognisable building function

> appearance follows function
> recognisable destination
> variety, hierarchy, relative position

identifiable organizing principle

> spatial relations

>> let people know how the circulation system works
The circulation system is the network of paths people use to move themselves from one space to another. It’s therefore useful if people understand how this system works in order to anticipate on it.

clarity of direction

> straight paths
> turns of 90 degrees
> slight turns

clear circulation system

readable in building volume

> expressive building volume
> transparanties

create concentration of association at nodes

clear spatial layout

> create lines of sight
> clear routes with destinations
**let people know how they can go to a place**

The ease of access to a place determines if the way towards it can easily be found. The accessibility of a place consists out the connections the place has and how good these connections are.

**use of signage**

By using directional signs the direction of pathways can be given.

**consistent design**

- locational clues
- naming systems
- placements of signs
- graphic display
overview of design principles

| support wayfinding capabilities of the person
  |person - articulation
  |use decision points
  >> be careful with the amount of decision someone have to make at a decision point.
  >> the environment should provide the necessary cues at decision points
  |consider the visual field
  >> be aware of the human visual field
  >> by considering the scanning and glancing process, be consistent in placing elements or information and using particular characteristics
  |design with light
  >> use light as an orientation point
  >> place important places at spaces with more light
  |grouping the information
  >> use gestalt principle to communicate the structure
  |information selection
  >> create a potential decision plan for each user group
  >> avoid information overload

| acquiring a cognitive map
  |person - organisation
  >> provide imageability
  >> give places an identity
  >> don’t create more than three features of the same appearance.
  >> if no clear identity is present, then people tend to pay attention to smaller distinct details. This can be less reliable as smaller features are not always good to spot or create gaps in the cognitive map
  |cognitive maps need a structure
  >> avoid ambiguity
  >> communicate a clear structure
  >> structure elements in groups that are interdependent and have strong relations with each other
  |create places with meaning
  >> use design to reinforce already existing social meaning, not to negate it.
  >> these characteristics of the built environment are memorable in the environmental cognition and should therefore play a dominant role within the design.
  >> the form of the building, (2) visibility and access, (3) use, (4) symbolic significance
  >> be aware of the development of a cognitive map
  >> make sure that there are enough landmarks to create mental anchor points
  >> create one central route which easily allows a sequential map
  >> allow branches along the central route to construct an overview map
  >> be aware of distortions people make in their cognitive map
  >> simplification | People tend to store the representations as simple as possible. closure, conciseness, symmetry.
  >> accentuation | people tend to overemphasize particular parts, characteristics or special elements in their environment.
  >> distortion | objects are joined or rotated in the cognitive map, while this was not the case in reality.
  >> important places are bigger projected and are more dominant in the cognitive map.
  >> relative distances tend to be longer when it has more distinctive features that form mental anchor points. Distances to places that are more appreciated, seems to be shorter in relative distance then places who are disliked.
  >> due to a clustering effect in mental representation two places in the same district seems to be closer to each other than places in two different districts.
| evoke a strong cognitive map |
| environment - organization |

- **spatial organization**
  - the designer should make sure that the organization principle of the spatial arrangement is easy and fast detectable and comprehensible.
  - make sure that the circulation system doesn’t allow ambiguity or confusing options.
  - keep an organization relative simple so it easy to understand.
  - the organization principle is thus predominant and everything that does not fit this organization will get extra attention.
  - create a hierarchical structure organize from public to private.
  - avoid unclear structures.

- **spatial correspondence**
  - anticipate on the expectancy people have for different floors.
  - avoid the making of gaps in the cognitive map.
  - Special attention goes to the border between ground–underground, inside–outside and within enclaves.

- **spatial enclosure**
  - the building volume should express its content and internal general organization.
  - make sure that the building form expresses its accessibility.
  - avoid a misalignment with the internal organization.

| communicate intent of the environment |
| environment - articulation |

- create a legible environment
- **keep the layout relative simple**
  - a simple layout is easier perceived through articulation.
  - provide the user with an ordered possibility of choice at decision points.

- **create visual access**
  - create visual access to the architectural differentiated spaces and elements.
  - create visual access to the architectural elements needed for wayfinding.
  - create an overview.
  - be aware of lines of sight (horizontal and vertical).

- **ensure architectural differentiation**
  - use distinct features and be careful with uniformity and repetitive architectural features.
  - make sure that the major architectural elements pertaining to wayfinding are differentiated from the general background.

- **use signage**
  - make the graphical information accessible.
  - being consistent of the graphic display and placement helps the people to know where to look wherever they seem to be needing information in the scanning process.
  - avoid an excess of information overload.
  - be aware of the content of the signs.
<table>
<thead>
<tr>
<th>elements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>path</strong></td>
</tr>
<tr>
<td>&gt; give visual dominance to pathways, with their own characteristics of space, view and motion, because they are the main influence in forming mental maps of a space.</td>
</tr>
<tr>
<td>&gt; make series of (intermediate) goals as mental anchor points and place them along point of interest.</td>
</tr>
<tr>
<td>&gt; Be aware of the process of walking</td>
</tr>
<tr>
<td>&gt; Place glimpse of view at points of transitions; not in places they stay.</td>
</tr>
<tr>
<td><strong>nodes</strong></td>
</tr>
<tr>
<td>&gt; make nodes as strong anchor points</td>
</tr>
<tr>
<td>&gt; keep nodes simple</td>
</tr>
<tr>
<td>&gt; make sure that the next node is visible.</td>
</tr>
<tr>
<td><strong>districts</strong></td>
</tr>
<tr>
<td>&gt; make districts distinctive</td>
</tr>
<tr>
<td>&gt; create a hierarchy of districts</td>
</tr>
<tr>
<td>&gt; three different types of area's can be identified: reaching major zones from the key access to the setting, reaching one zone from the other and reaching places within the zone.</td>
</tr>
<tr>
<td><strong>edge</strong></td>
</tr>
<tr>
<td>&gt; create a continuation</td>
</tr>
<tr>
<td>&gt; allow penetration</td>
</tr>
<tr>
<td>&gt; articulate entrances</td>
</tr>
<tr>
<td>&gt; connect the inside with outside space</td>
</tr>
<tr>
<td>&gt; create an overlap</td>
</tr>
<tr>
<td>&gt; soften the barrier</td>
</tr>
<tr>
<td>&gt; communicate the hierarchy of public and private</td>
</tr>
<tr>
<td><strong>landmark</strong></td>
</tr>
<tr>
<td>&gt; create a singularity</td>
</tr>
<tr>
<td>&gt; Place landmarks on decision points along the route.</td>
</tr>
<tr>
<td>&gt; let landmarks differ in size</td>
</tr>
<tr>
<td>&gt; create visual exposure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>facilitate screening of a space</strong></td>
</tr>
<tr>
<td>&gt; make a defined space</td>
</tr>
<tr>
<td>&gt; make joints clear</td>
</tr>
<tr>
<td>&gt; make a place visible as a whole</td>
</tr>
<tr>
<td><strong>let people know they are approaching a place</strong></td>
</tr>
<tr>
<td>&gt; signalise the upcoming presence of a place</td>
</tr>
<tr>
<td>&gt; concentration of association</td>
</tr>
<tr>
<td><strong>let people know where they are on a path</strong></td>
</tr>
<tr>
<td>&gt; articulate the path in the environment</td>
</tr>
<tr>
<td>&gt; create a sense of progression</td>
</tr>
<tr>
<td>&gt; create a sense of motion</td>
</tr>
<tr>
<td>&gt; differentiate end and beginning</td>
</tr>
<tr>
<td><strong>let people be able to orientate themselves with a specific element</strong></td>
</tr>
<tr>
<td>&gt; make orientation points/area</td>
</tr>
<tr>
<td><strong>use of signage</strong></td>
</tr>
<tr>
<td>identification</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>&gt; let people be able to see where something is</td>
</tr>
<tr>
<td>&gt;&gt; create visual exposure</td>
</tr>
<tr>
<td>&gt;&gt; make clear how to enter/leave</td>
</tr>
<tr>
<td>&gt; let people be able to understand a form</td>
</tr>
<tr>
<td>&gt;&gt; make easily distinguishable forms</td>
</tr>
<tr>
<td>&gt; let people be able to see the difference between elements</td>
</tr>
<tr>
<td>&gt;&gt; make a clear contrast</td>
</tr>
<tr>
<td>&gt;&gt; make joints clear</td>
</tr>
<tr>
<td>&gt;&gt; give a place meaning</td>
</tr>
<tr>
<td>&gt; let people know which elements belong together</td>
</tr>
<tr>
<td>&gt;&gt; group elements together</td>
</tr>
<tr>
<td>&gt;&gt; create a continuity</td>
</tr>
<tr>
<td>&gt; let people focus their attention on an element</td>
</tr>
<tr>
<td>&gt;&gt; let an element be dominant</td>
</tr>
<tr>
<td>&gt;&gt; visible placement</td>
</tr>
<tr>
<td>&gt;&gt; create a singularity</td>
</tr>
<tr>
<td>&gt; use of signage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>navigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; let people know how a connection is made</td>
</tr>
<tr>
<td>&gt;&gt; directional differentiation</td>
</tr>
<tr>
<td>&gt; let people understand how the building is structured</td>
</tr>
<tr>
<td>&gt;&gt; create hierarchy</td>
</tr>
<tr>
<td>&gt;&gt; create a clear structure</td>
</tr>
<tr>
<td>&gt;&gt; recognisable building function</td>
</tr>
<tr>
<td>&gt;&gt; identifiable organizing principle</td>
</tr>
<tr>
<td>&gt; let people know how the circulation system works</td>
</tr>
<tr>
<td>&gt;&gt; clarity of direction</td>
</tr>
<tr>
<td>&gt;&gt; clear circulation system</td>
</tr>
<tr>
<td>&gt;&gt; readable in building volume</td>
</tr>
<tr>
<td>&gt;&gt; create concentration of association at nodes</td>
</tr>
<tr>
<td>&gt;&gt; clear spatial layout</td>
</tr>
<tr>
<td>&gt; let people know how they can go to a place</td>
</tr>
<tr>
<td>&gt;&gt; make places easy accessible</td>
</tr>
<tr>
<td>&gt;&gt; create an effective layout</td>
</tr>
<tr>
<td>&gt;&gt; articulate the circulation system</td>
</tr>
<tr>
<td>&gt; use of signage</td>
</tr>
</tbody>
</table>
Now that the objectives and the corresponding means are explained, they should now be applied. Depending on what information is facilitated on what place and how it is communicated through the articulation of the building, First the area’s will be explained, how the recommendations connects with these area and finally which design tools are available to articulate the meaning of the objectives.

> design process
By defining the areas of application which are important where specific information should be communicated towards the wayfinder, we can efficiently apply the recommendations. The question however is what information the user needs where and how we can design to act on it. Buildings are nested environments in which scales, meaning of elements are interrelated. Depending on the scale elements can have a different meaning. The areas are based on the five elements of Kevin Lynch which go across different levels scale as these elements are also noticeable on a smaller hierarchy. The elements only shift with the properties of the scale. Depending on the method of use these elements can be considered as spaces (organization) or objects (articulation).
> organisation

The specific organization of a setting heightens the imageability of an image; it facilitates visual identification and structures the map. The elements which are defined by Lynch (paths, edges, landmarks, nodes and regions) form together the building blocks of the image that should offer this differentiation and structure. But the way these elements work together is essential to guarantee an imageability of a place. In the organization the elements can be considered as area’s in an overview of the organization.

>> overview

Within the overview situation the different elements has to ensure the spatial organization of the setting. Connections can be made between the separate images which are required through the articulation. With a good organization these images will be easier synchronized with each other. A certain simplicity of the spatial layout allows the observer to grasp the organization to structure their cognitive map upon. Also the amount of visual access between spaces can be established in the overview.

>> use of the two dimensional representation

The use of a two dimensional representation is necessary to create an overview of the situation. Characteristics in the overview shows what is in the design. It depends on the scale what is shown. The 2D representation is something people won’t experience in its totality during their experience through the environment.

>> scales

By defining which properties are dominant in which scale, we know what information we have to design to communicate to the user. This division in scale is direct applicable into the design process. What information is needed and/ or provided on which scale?

1:1000 | The urban placement in the environment.
1:500 | The building form and structural system
1:200 – 1:100 | The façade, functional organization and the circulation system
1:50 | Materialization and the flexible furniture
1:20 - 1:5 | Detailed plan of how joints are connected

---

2 (Passini Groen 120) Quote checken
elements

> path | Within the paths we can identify three different types. Based on the importance of the line of movement, the paths can be differentiated in primary, secondary or tertiary paths.

> node | Different nodes can be identified as the cross roads between the different paths. Usually these are the decision points on routes.

> district | Within the district we can structure the hierarchy of spatial functions within the ensemble: ensemble and building as district. Within the building there are different districts: foyer, destination area, supportive functions and public space.

> edge | Elements which define the borders can be the area’s between outside – inside, public-private, horizontal-vertical and between programs.

> landmark | Area’s which functions as landmarks can be used as major or local landmarks.
articulation

‘If one requires into the environmental characteristics that render image formation easy or difficult, one finds that the existence and articulation of these basic elements are important as well as the order that establishes a coherent relation among these elements.’

The intent and organization of the environment is articulated through the different images people see during their movement through time and space. People use this information to identify the organization principle. The way different elements are articulated determines its influence and importance for the creation of the cognitive map.

>> image

The observer depends on the information which is obtained through the image. In every building the necessary architectural features (like the stairs, entrance, elevator) are present, but it is the way they are articulated where there is much to gain. If they are articulated well, they can for example serve as mental anchor points for the organization. How can the articulation of such elements helps by designing it?

Within the articulation, laws of the Gestalt structures what people really perceive. By guaranteeing visual access from anchor point to anchor point, making architectural features distinctive and complement it with the necessary signage, it will improve the wayfinding achievements.

Within the image we can distinct two separate views:

> outside | the perspective view of the outside which is concerned with the view of how the building is approached. The first impression is made in this image, where building can show some of its internal organization. This spatial enclosure is unique for the approach form outside. Where different distances towards the building show different aspects of its ensemble.

> inside | The second perspective tells us about how the interior is seen. Within the inside spatial correspondence becomes more important, as it the spaces are more divided from each other and less accessible. Can we perceive the buildings organization and what belongs with what and what doesn’t?

2 Romedi Passini, Wayfinding in architecture (New York: Van Nostrand Reinhold, 1992), 120.
**use of perspective**

Within a perspective people will only see a glimpse of the building, it is only with the collection of all these images that people develop a coherent mental image of a setting.

Standing in a particular area, what potential information is provided?

- **approach**: the urban placement, as the architectural features such as the building form, façade, structural system, functional organization and circulation system. Compared with the interior image, the approach gives a more overview of the systems.
- **interior**: Within the interior we only experiences a glimpse of the functional or circulation system in one image; we need a serie of them to identify the organization. Specific for the inside perspective is how the interior spaces are organised in the sense of the form of the place, the used materiars, furniture, structural elements, installation and details.

- **path**: can be seen as a continuous elements so that it creates a ‘path’ through different images and it therefore able to connect these images mentally
- **node**: a crossroads of different path which come together in the image. Can also be seen as point of activity.
- **district**: surfaces such as the floor, walls or ceiling.
- **edge**: the joint between elements, mostly surfaces
- **landmark**: elements that is unique in its location or unique for that image. This can be major elements or just some small details.

**scales**

In the perspective view, scales do not apply as they do in two dimensional representations. We only zoom in on the details. What is defining a place, is done by the architecture. Moving on in scale means zooming in; interior decisions, materialization, joints between elements, etc will define the atmosphere in the space.
Area's of application

Most of the area's are in the elements are defined by the overview. There are however some exceptions. Images which are specific for the approach is determined by how far away how are of the building. This is determined by the size of a building: at approximately ten times the height we encountered with the mass of the building, at three times the height you get a total overview of the ensemble, at two times the height the general appearance becomes clear and when the distance equals the height of the building finer details are visible.

Further more within the environment three different types of area's can be identified: reaching major zones from the key access to the setting, reaching one zone from the other and reaching places within the zone. Major destination zones which correspond with the key wayfinding tasks should be identified.4

What information is needed for the wayfinding task? And in which area? In the different perspective different information is at your disposal and considering the wayfinding task, this information is needed at these area's to complete this task.

<table>
<thead>
<tr>
<th>path</th>
<th>node</th>
<th>edge</th>
<th>district</th>
<th>landmark</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Path" /></td>
<td><img src="image2.png" alt="Node" /></td>
<td><img src="image3.png" alt="Edge" /></td>
<td><img src="image4.png" alt="District" /></td>
<td><img src="image5.png" alt="Landmark" /></td>
</tr>
</tbody>
</table>

**Approach | Object in Space**

<table>
<thead>
<tr>
<th>&gt; 500 m</th>
<th>&gt; activity pockets</th>
<th>&gt; outside – inside</th>
<th>&gt; ensemble</th>
<th>&gt; major</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 150 m</td>
<td></td>
<td></td>
<td>&gt; building</td>
<td>&gt; local</td>
</tr>
<tr>
<td>&gt; 100 m</td>
<td></td>
<td></td>
<td></td>
<td>&gt; detail</td>
</tr>
<tr>
<td>&gt; 50 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Interior | Space in Object**

<table>
<thead>
<tr>
<th>primary</th>
<th>secondary</th>
<th>tertiary</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; crossroads</td>
<td>&gt; foyer</td>
<td>&gt; activity pockets</td>
</tr>
<tr>
<td>&gt; horizontal – vertical</td>
<td>&gt; public - private</td>
<td>&gt; between programs</td>
</tr>
<tr>
<td>&gt; foyer</td>
<td>&gt; destination area</td>
<td>&gt; public space</td>
</tr>
<tr>
<td></td>
<td>&gt; major</td>
<td>&gt; detail</td>
</tr>
</tbody>
</table>

---

> applying the principles

In this overview the principles are structured on the wayfinding objectives and the specific areas of the proposed elements. Defined spaces can be made on the area’s of the element, but it’s less possible to use this recommendation on a 1:500 scale.

<table>
<thead>
<tr>
<th>Facilitate screening of the space</th>
<th>clear joints</th>
<th>clear joints</th>
<th>clear joints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defining space</td>
<td>presence of place</td>
<td>presence of place</td>
<td>presence of place</td>
</tr>
<tr>
<td>Approaching a place</td>
<td>clear joints</td>
<td>clear joints</td>
<td>clear joints</td>
</tr>
<tr>
<td>Presence of a place</td>
<td>presence of place</td>
<td>presence of place</td>
<td>presence of place</td>
</tr>
<tr>
<td>Concentration of association</td>
<td>clear joints</td>
<td>clear joints</td>
<td>clear joints</td>
</tr>
<tr>
<td>Being on a path</td>
<td>clear joints</td>
<td>clear joints</td>
<td>clear joints</td>
</tr>
<tr>
<td>Sense of progression</td>
<td>clear joints</td>
<td>clear joints</td>
<td>clear joints</td>
</tr>
<tr>
<td>Sense of motion</td>
<td>clear joints</td>
<td>clear joints</td>
<td>clear joints</td>
</tr>
<tr>
<td>See where something is</td>
<td>clear joints</td>
<td>clear joints</td>
<td>clear joints</td>
</tr>
<tr>
<td>Visual exposure</td>
<td>clear joints</td>
<td>clear joints</td>
<td>clear joints</td>
</tr>
<tr>
<td>Mark important area/entrances</td>
<td>clear joints</td>
<td>clear joints</td>
<td>clear joints</td>
</tr>
<tr>
<td>Understand a form</td>
<td>clear joints</td>
<td>clear joints</td>
<td>clear joints</td>
</tr>
<tr>
<td>Make easily distinguishable forms</td>
<td>clear joints</td>
<td>clear joints</td>
<td>clear joints</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Difference between elements</th>
<th>clear contrast</th>
<th>clear contrast</th>
<th>clear contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Group elements</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Continuity of elements</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
</tbody>
</table>

| Identity | clear contrast | clear contrast | clear contrast |
| Continuous element | clear contrast | clear contrast | clear contrast |
| Dominance of element | clear contrast | clear contrast | clear contrast |
| Contrast with surroundings | clear contrast | clear contrast | clear contrast |
| Singularity of elements | clear contrast | clear contrast | clear contrast |

<table>
<thead>
<tr>
<th>Accessibility</th>
<th>clear contrast</th>
<th>clear contrast</th>
<th>clear contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable differentiated</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Make orientation points/areas</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Create hierarchy</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Recognisable building function</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Identifiable organisation</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Clear structure</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Recognisable building function</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Identifiable organisation</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Clarity of direction</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Readable in building volume</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Logic spatial layout of routes</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>How to go to a place</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Make places easy accessible</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Reduce obstacles</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td>Use of shortcuts</td>
<td>clear contrast</td>
<td>clear contrast</td>
<td>clear contrast</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>PATH</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>defined space</td>
<td>clear joints</td>
<td></td>
</tr>
<tr>
<td></td>
<td>presence of place</td>
<td></td>
<td>concentration of association</td>
</tr>
<tr>
<td></td>
<td>differentiate end and beginning</td>
<td></td>
<td>sense of progression</td>
</tr>
<tr>
<td></td>
<td>sense of motion</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>visual exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NODE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>defined space</td>
<td>clear joints</td>
<td></td>
</tr>
<tr>
<td></td>
<td>presence of place</td>
<td></td>
<td>concentration of association</td>
</tr>
<tr>
<td></td>
<td>differentiate end and beginning</td>
<td></td>
<td>sense of progression</td>
</tr>
<tr>
<td></td>
<td>sense of motion</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>visual exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EDGE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>defined space</td>
<td>clear joints</td>
<td></td>
</tr>
<tr>
<td></td>
<td>presence of place</td>
<td></td>
<td>concentration of association</td>
</tr>
<tr>
<td></td>
<td>differentiate end and beginning</td>
<td></td>
<td>sense of progression</td>
</tr>
<tr>
<td></td>
<td>sense of motion</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>visual exposure</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DISTRICT</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>defined space</td>
<td>clear joints</td>
<td></td>
</tr>
<tr>
<td></td>
<td>presence of place</td>
<td></td>
<td>concentration of association</td>
</tr>
<tr>
<td></td>
<td>differentiate end and beginning</td>
<td></td>
<td>sense of progression</td>
</tr>
<tr>
<td></td>
<td>sense of motion</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>visual exposure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>clear contrast</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>continuity of elements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>educated seeking</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>dominance of element</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>contrast with surroundings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>singularity of elements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>suite differentiated</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>make orientation elements</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>hierarchy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>clear structure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>recognisable building function</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>clarity of direction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>readable in building volume</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>logic spatial layout of routes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>easy accessibility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>reduce obstacles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>use of shortcuts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

107
designing the elements

By switching between the organization and the articulation we continuously interact with the way the visitor will experience the building. Considering what is need at which scale and designing that information, will have its direct effect on the perspective view of the building or area. As the scales goes up the developing of the image becomes a fact; details or materialization become more important. The focus of design shifts in the overview with each scale. By developing the overview different perspectives are accompanied with a specific perspective. In the overview this process is laid out:
depending on the design phase different aspects become important. This diagram shows the distinction between the approach and interior view.
environmental characteristics

This overview shows the specifics of the characteristics which are available.

articulation | by clearly articulating and coherent grouping of the space (interior as exterior) of the site and setting, building form and architectural features and the articulation of interior spaces.

SITE AND SETTING

landscape
- entrances ensemble
- pedestrian routes
- pathways
- nature
- trees
- planting

ARCHITECTURAL FEATURES

facade cladding
- textures
- materials
- colors
- ornamentation

functional organisation
- functions
- sanitair
- entrance zone
- public zone
- destination zone

circulation system
- transport area
- foyer
- horizontal
- vertical
- spatial relations
- height
- accessibility
- visibility

ARCHITECTURAL FEATURES

building form
- building volumes
- placement of openings
- entrances
- roof design
- entrance zone
- public zone
- destination zone

structural system
- floors
- walls
- spatial relations
- height
- accessibility
- visibility

ARCHITECTURAL FEATURES

functional organisation
- functions
- sanitair
- entrance zone
- public zone
- destination zone

circulation system
- transport area
- foyer
- horizontal
- vertical
- spatial relations
- height
- accessibility
- visibility

INTERIOR SPACES

form of space
- building volumes
- placement of openings
- entrances

cladding
- floor
- walls
- ceiling

furniture
- fixed
- flexible

structural elements
- installations
- detailing
organization | create legible circulation system design with different design concepts, roads or level change devices.
design tools

The design tools are the tools the designer can use to communicate the intent and organization of the building to the user. These tools consists out of characteristics (particular elements out of the environment) and principles (ways to use this characteristics).

uses
- gradients
- densification
- differentiation
- transparencies
- grouping
- consistency
- simplicity/clarity
- overlapping
- use of light

characteristics
- landscape
  - topography
  - trees, plants
- color
- material
- transparency
- ornamentation
- symbolic detail
- composition
- rhythm
- gestalt principles
- geomatic rules
- balance
- pattern
- light
  - color
  - elements
  - openings
- color
- gradient
- light units
- texture
- symbolic detail
- ornamentation
- transparency
**space**
- dimensions (height, width, length)
- convex spaces
- voids

**shape / form**
- form language
- style
- clarity
- silhouette

**architectural elements**
- balustrades
- open spaces
- striking building feature

**furniture**
- planting
- art
- flexible
- fixed

**functional**
- activities
- use
- building type
- function

**non-architectural**
- signs
- names
- meanings
- status
- smell
- sound

**other**
- directions
- perspective
- scale
- floor surface

---

- ceiling height
- texture | symbolic detail
- void

- shape
- texture | symbolic detail
- texture | symbolic detail

- void
- striking building feature
- balustrades

- flexible furniture
- fixed furniture
- art

- activities
- function
- use

- signs
- status
- meaning

- perspective?
- directional
design implementation

11| design objective
wayfinding experience 116
environmental complexity 117
recommendation 117

12| approach
methodology 118
analysis 118
location 118
wayfinding task 119
user groups 120
strategy 121
functional analysis 121
planning wayfinding solutions 121
storyboard 122
strengthen with anchor points 122
translate it to spaces 123

13| design proposal
process 124
design description 128
relation theory - design 132
Within the design implementation focus will be entirely on the design. First, the design objective [a] will be formulated based on the wayfinding knowledge found in the literature. Then a strategy [b] based on the wayfinding approach is described, which focuses on the route the visitors has to take and uses different methods to explore the different potential problems a visitor can encounter. The design objective and design approach are generic, but a test case [c] is used to illustrate the strategy and to test the implementation of the design patterns on an architectural design proposal.

This design project is based on the South Bank in London and will house a large public program. The project functions as a test case to explore what it means to use the wayfinding criteria which are set through this thesis. After the process leading to the design proposal is discussed, the final design will be described. Finally the relations with the wayfinding theories are made by making clear which parts of the wayfinding knowledge can be found in which parts of the proposal.
Within the design objective it we have to synergize the stated ambitions, preconditions and wishes of the location, brief and the architect’s vision. The recommendations out of the literature have to be applied with certain consideration and with the right balance of information and complexity. The building should be somewhere you unconsciously get pulled into, be challenging, but does not lead to frustration and despair. The goal of the design challenge is therefore to create a dynamic and attractive environment with supplies a high level of satisfaction and offers room for involvement, but guarantees at the same time places for privacy. Vital is how to implement these specific recommendations within the design process.

The design patterns do not introduce new elements; to make the designer aware of their influence. By emphasizing the elements that can have the most effect on wayfinding performance, the way they are organized and how they are perceived is what these patterns do.

> Wayfinding cannot be dissociated from experiencing space. We have seen that it is possible and indeed desirable to plan for interesting, complex and diversified settings and still assure efficient wayfinding. Efficient, complex settings can be designed while respecting basic wayfinding processes.’

by Romedi Passini in ‘spatial representations a wayfinding perspective’ (1984)

> wayfinding experience
Wayfinding demands complete involvement with the environment. Perceptual and cognitive processes are continuously in action. The environment is scrutinized to extract information selectively. We interpret the information, structure it and integrate it with the already existing body of knowledge. While finding its way the visitor tries to understand the setting he is in and he uses the information obtained to make decisions and structure these in an action plan. The designer has to predict the decision plans, their consequences and assets their merits.¹

Within the wayfinding design there is of course a functional nature of reaching the destination in an efficient manner within limits of time and energy. Especially in emergency situation, where we have to act quickly, the environment should allow a fast, easy and a straight-forward wayfinding process. The design has to provide the environmental information for decision making and decision execution. The purpose of the commute is an example of this functional nature.

A second dimension is more evaluative, which considers wayfinding as a fundamental key to environmental appreciation. The experience gained during wayfinding establishes a strong relation with environment and spatial characteristics which distinguishes the environment. Experiencing a setting has a strong relation with wayfinding satisfaction and environmental characteristics.² Buildings with an obvious logic, does not always have to be the best facilitator for a good wayfinding experience. A complex building can heighten the experience and stimulate the wayfinding process.² In the quest and explore purpose this factor is of great value.
environmental complexity

To what extent can we design for environmental complexity? When does complexity become negative? We have to understand the complexity of the environment; its spatial configuration meaning and user-related characteristics. The environment cannot be too difficult, but also not too simplified. Interesting environments are more attractive, because it will give the visitor a problem to solve and he will be cognitively challenged. These wayfinding challenges spikes people’s interest and curiosity, stimulate their wayfinding capabilities and will lead to a better understanding. Satisfaction will easily derive from solving these problems and exploring new forms. Without a certain degree of complexity, problem solving becomes banal and makes exploration useless. However, not being able to grasp the complexity or the wayfinding problem can lead to disappointment, fear and desperation. Obviously we need to add logic in a consistent manner to create an understandable environment, but at the same time it should also not to be too logic.

Within the design we should consider that the people themselves will give meaning to a place. The environment should therefore be open for the involvement of people. It needs human activity and active involvement to avoid dead and sterile places. The density of meaning has a strong relation with environmental complexity.

Environmental complexity is therefore desirable ‘...as long as the design of the setting, including the wayfinding support systems, guarantees efficient information processing performances’. It is up however to the designer to decide on this grey area of environmental complexity and information overload what is good for the particular design problem.

recommendation

The design objective is to find the perfect balance between clear architectural legibility in organization and articulation, without making this obvious. An obvious lay-out and articulation would be fast described as boring and not stimulating. The goal of the design is to search for the threshold between a boring and an illegible design. Being aware of the constrains of how people find their way will help to avoid the development of an illegible architectural design.

---

1 Romedi Passini, Wayfinding in architecture (New York: Van Nostrand Reinhold, 1992), 160. (check letterlijk quoten)
2 Romedi Passini, Wayfinding in architecture, 1992, 159.
3 Romedi Passini, Wayfinding in architecture, 1992, 165.
4 Romedi Passini, Wayfinding in architecture, 1992, naar quote
5 Romedi Passini, Wayfinding in architecture, 1992, naar quote
6 Romedi Passini, Wayfinding in architecture, 1992, naar quote
7 Romedi Passini, Wayfinding in architecture, 1992, naar quote
8 Romedi Passini, Wayfinding in architecture, 1992, 162.
The generic design approach which will be described is an user-based approach. The logic of design method is the conceptualization of wayfinding as a spatial problem-solving process. We therefore need the analysis to clarify what the design problem is and from there working with the necessary reflection towards design solutions. Wayfinding design has to act on how conceiving information systems has to be made that allow the user in a setting to reach destinations within acceptable expenditures of time and energy. The required information is determined by the wayfinding solution (derived from the information gathered) the user develops. Within this approach wayfinding behavior has to be foreseen, the corresponding collective decision plans determined and designed according this information. The focus will therefore lay on the experience of the visitor. With which purpose and level of knowledge will he visit the building? What will he see and how does he know where to go.

**methodology**

The different approach I want to address corresponds with the alternative design method I used during my design process; instead of primarily designing from a top-view (organization) and I wanted to design from a people perspective (articulation). What do we see at what point? What do we want to see? The designer has to cope with the problem of the degree of complexity, therefore it is important to simulate with eye-level perspectives and models how a potential visitor will experience the building.

**analysis**

*location*

The wayfinding design starts with identifying the key (entrance) routes on site. Different sights and views towards the site are determining how people approach the building. Different distances from which the building can be seen have different influences and can communicate different things, depending on what can be seen from that particular point of view. The width of the circulation and the directness of access are determining the physical constraints. We have to choose the routes, apply the notation system to indicate decisions for change of direction or when change of level is observable.
routes leading towards the site with the different viewports. The thickness of the arrows resembles the intensity of the route (thicker is intenser).

wayfinding tasks (program)

By clearly identifying what the wayfinding tasks are and grouping them according their destinations. Three types of tasks can be identified: reaching major zones from the key access to the setting, reaching one zone from the other and reaching places within the zone. Major destination zones which correspond with the key wayfinding tasks can be identified. These destination zones can be articulated by functional, physical expression or general atmosphere.

3 Romedi Passini, Wayfinding in architecture, 1992, 177.
4 Destinations are grouped and clustered to help the mental organization of a setting. Mental representation/cognitive maps is constantly structuring the image, regrouping of destinations and identifying its corresponding task and action. Major entrances and exits play a particular role in these images.
5 Romedi Passini, Wayfinding in architecture, 1992, 172.
user groups

The user is the design base; therefore we have to identify the (potential) users of the building and the surrounding area. Within these groups we have to make a special users group which need special attention. These group include the blind, the physically handicapped, buggy’s, but also children and elderly people.

In these groups we have to consider size of the group, level of environmental knowledge, information-processing difficulties and problems of access. Depending on the level of knowledge and purpose of the visit we can identify different purposes and conditions with different functional and evaluative demands: commute, explore and quest. For each major destination zones we have to find the corresponding wayfinding conditions that apply for that particular situation.
strategy

Now the particular tasks, users and conditions are identified, we have to combine the elements for the major groups of users to create different scenarios. The least pleasing combination, but which also satisfies the better combinations, should be taken as guide.8

'The research in the wayfinding process is similar to what a wayfinding consultant/designer does. He has to anticipate visitor patterns, understand the underlying logic and act to it. (p.36) Every visitor has to make a sequence of decisions to find his way and the designer has to anticipate in it to make a seamless visitor experience. With the wayfinding strategy the designer can find the underlying logic to know from where to direct to where.' - David Canter in Psychology of place, 1950

> functional analysis

By analyzing the different function and especially their relations with each other, their size and their degree of publicness. Different diagrams can be made which represents possible routes between the different functions. A public area can filtered from these diagram and transformed into a different networks (for example along a route; lineair).

> planning wayfinding solutions

Also higher-order decisions are part of the solution and require information as well. When a route is identified, we have to build up a corresponding decision diagram. A decisions diagram is comparable with a functional analysis in architectural design. It represents the logic behind people's actions and the required information. The designer has certain influence on how this decision plan will be made by the visitor.10 We need to identify behavior and higher order decision leading to that behavior to make general design ideas; we need to do A “in order to” accomplish B. This simulation depends on the task, user characteristics and wayfinding conditions. We need to pick up particular information and make an action.11 We need to develop desirable wayfinding solutions in behavioral terms (the routes) and in cognitive terms (the decision diagrams).12
> storyboard

What information do we need at what moment to accomplish what task? This simple notation system of a decision diagram, describing wayfinding episodes, has to be transformed into a design. A useful tool is to make a story board translating the text from the decision diagrams into drawings of how the possible routes will look like; by transforming the experience into a storyboard, the wayfinding task can be laid out along the route. The storyboard can anticipate on any potential problems the visitor can encounter in its wayfinding experience. Within the storyboard we have to define which decision in a person has to made in the different scenes. The place of the decision is starting to get shape.

> strengthen with anchor points

Cognitively the route can be strengthened with specific anchor points. Places with a clear identity of meaning can be created through the use of specific activities or atmospheres on, next to or along the route.
translate it to open and closed spaces

The activities defining the building have to be transformed into the specific places which can represent the activity. A distinction is made between activities that are open (like a café) or closed activities (like a cinema). These are the building blocks with which the designer can design. This can for example be the route itself which creates different places by the position of the open and closed spaces.
process

September 2012 | exploring the motivation
Beginning with the project, the motivation needed be translated into a project.

October 2012 | setting up the project [P1]
The framework of the research is set and a suitable site with a public program has been found.

November 2012 | location analysis
The surrounding location (South Bank, London) has been analyzed on different scales, finding out the complexity of the site.

December 2012 | researching the different morphological options
By building a model 1:1000 the site’s possibilities are researched and a challenge is found in the tower option.

January 2013 | developing the concept [P2]
First recommendations from the research are starting to get shape and the concept of a higher public domain gets a new form.
February 2013 | exploring the possibilities of shifting floors
After the P2 presentation the designing part starting to take off. How can the concept translated with the wayfinding theory. The goal is to direct the people through the building by districts of shifting the floors and creating different voids within the building.

March 2013 | stacked boxes
Recommendations of form simplicity and communicating the organization. A model is found in five boxes which are stacked and shifted. This represents how the floors shifts relatively from each other and how the functions articulate themselves within the form of building.

April 2013 | add a shell around the blocks [P3.1]
The building form is explored which creates different border areas. What kind of added value have these spaces? A shell is introduced to insure the tower appearance from a distance (represents the scale of 1:1000) so it can be recognized as a tower. User perspectives are used to see how the building is going to be perceived.
May 2013 | atmospheres
The research points out how the atmospheres can be used as anchor points within the route. The public domain is considered as a route, where the people move from one space with a specific atmosphere to another. The shell is put overboard but development of good floor plans remains problematic.

June 2013 | façade with its detailing [P3.2]
The floor plans which represents the concept are still not found, but slowly options are getting unwrapped. However, the façade and materialization of the design can be developed without the right floor plans. Within the perspectives the building gets more lively and vivid.

July 2013 | research report concept
The research report is wrapped up; the theoretical framework, the empiric research and the design implementation is finished.
August 2013 | assembling the floors
In the summer recess the building gets assembled as the floor plans are developed in 3D. The concept is articulated through the plan with shifting floors and changing atmospheres. These spaces of different heights and angles are created through the dynamics of the floor slabs.

September 2013 | losing the boxes
In September the ideas of different boxes is let go, as it helped to bring the floor plans. The spaces can now grow within the boundaries of the tower. This creates a more fluent flow through the building. Climate and sustainability strategies are also using the concept of the visitors flow within the building.

October 2013 | rounding up the project [P4]
After the GO for graduation, the research report is finished, the final materials are selected and the last details are designed. Final renderings and a physical model at scale 1:100 are prepared for the final presentation on November 7th.
design description

The design proposal functions as a test case for how the theory, design patterns and application can be used. Based on the values of environmental complexity and wayfinding experience set in the design objective a location was searched for which also had movement and a variety of users to research the wayfinding theme.

location | 1:2000

The location of the design site is found in the center of London, on the South Bank. This part of London is characterized by its high degree of public space and cultural venues. On this strip there is a parking lot which forms a vacuum of activities within this vivid space. The goal was to connect the different surrounding entities by proposing a new building on the parking lot which is able to synergize these different entities. The building houses a public program with a diversity of function, able to welcome a diversity of potential users.

urban implementation | 1:1000

Through different models the option of a tower was chosen to extend public domain in the vertical direction. A higher mass seeks the connection between the morphological structure of the high rise of the shell masterplan and bigger lower masses of the South Bank Center. By positioning it next to the Queen’s walk it is connected to this main route and frames public spaces with potential. The tower typology is interesting for wayfinding as the vertical connection within buildings is always problematic.
concept | 1:500

The concept has to synergize on the building scale. The route is the central theme along which different functions and atmospheres define the route. There is a public domain in which the functions and activities are positioned in. In this way the visitors can be directed through the building. The route has the freedom to take alternative routes and places to discover. Based on the surroundings it opens up on different places. On the lower side to the open park, on the second level above the train bridge and higher up towards the view of the city of London.

lay out the route | 1:200

Implementation of the concept is done through a system of floors and boxes. By analyzing the south bank centre a network of different layers was discovered where the boxes of the function sticks out of the mass. This principles is stretched out along with the public domain vertical. It connects the different function which all have different understandings of privacy; these different functions and the degree of privacy is articulated through the façade.
establish connections | 1:100
The different floors which are pushed up and down creates a landscape of activities where a connection is sought between the different floors. These floor slabs creates connection which all have their own identity. These floors allows to connect important anchor points on the public route to each other which leads through the building. The boxes as function are by its materialization and position are differentiated from this public landscape.

creating spaces |1:50
The dynamics of the floor slabs creates different spaces and places which communicates different atmospheres. Combined with the views, materialization and repetitive elements area's can be connected or especially differentiated. This borders do not always have to be hard as with the boxes, but can be part of the public domain.
articulate within the façade | 1:20

This facade element is an example where a the façade of a function meets the glass façade of the public domain. Communicating what is what and the friction between the public domain and a specific functions is displayed in this fragment. Through the density within the façade and through the extend parts of the floor a shadow is dropped on the facades which creates differentiation between the layers.

detailing | 1:5

Also within the details the different floors can be communicated. The end of the floors are extended which collects the rain water assembled at the façade and houses the sun shading. Through the façade the climate can be passively be ventilated, as this is part of the bigger public domain.
relation theory – design  
During the design phase the implementation of the wayfinding theory was one of the most important issues within the project. How do we see the recommendations back in the architectural design? In the coming chapter I will describe how different aspects within the design can be traced back to particular recommendations.

› wayfinding task  
The task of the environment is to people to orientate their selves in the environment, identificate their destination and navigation through the environment by finding the right way. There are three influential factors that can help to accomplish this task: the environment, the cognitive map and the personal abilities of the wayfinder.

› user analysis  
By analyzing the potential users the designer can formulate for whom he is designing. The function of the building can predict different users with different purposes. The amount of specific environmental information people have combined with their purposes influences what wayfinding techniques and strategies they are going to use.

› using the approach  
By using the approach of building up the perspective the correlation with the conventional scales can be found. First the size of the space is considered, then wayfinding elements can be added or the materialization of the cladding can be determined.

› route  
The route is the spine of the wayfinding experience; this is the path the visitor has to follow to come in contact with all of the functions of the building. This path shows itselfs to the visitor through the connecting floor slabs and path elements. By following specific elements which are consequently placed it can direct the visitor along the path.

› anchor points  
Points on the route where something is going on, where something specific is happening or where need to find an element, such as an escalator, will help to establish the route in the cognitive map. These points form the landmarks in our mental representation and are the beginning of the development of the cognitive map.
> districts

By creating a series of floor slabs which are pushed up and down, different districts are created. These floors use the materialization to communicate what belongs with what and is in this way able to break through the different separating floors. The flow of spaces ensures the route.

A contributing result is that the dynamics of the floors are able to create different atmospheres by differing in angle (different angle communicate different enclosures) and ceiling heights.

- 0 degrees > open landscape
- 15 degrees > open landscape
- 30 degrees > tribune
- 45 degrees > continuous floor slab
- 60 degrees > continuous floor slab
- 75 degrees > dividing wall
- 90 degrees > dividing wall
> **communicating the degree of privacy**

Through the different spaces and activities the route can articulate what the degree of privacy is. The contrast between spaces makes clear what is public and what is not. Higher spaces is associated with a public character, while smaller and lower spaces will prevent people of walking in. By switching between the different spaces with different activity the people are unconsciously directed along the route.

![Diagram of different heights communicating different degrees of privacy]

> **visual access**

The movement created by the pushing and pulling of the floor slabs creates the opportunity to look towards other floors. Boxes can be considered as destinations, but can also work as void; defining atmosphere and allowing visual access to other parts of the building. This guarantees the spatial correspondence as the floors are visually linked together.

![Diagram of spaces with specific atmospheres forming the anchor points of the route]

The route is structured according visual access between spaces blue | from outside [approach] magenta | from inside [interior]
> **guiding elements**
Continuous (railing) or repetitive element (acoustic columns) creates a group through the separate images. This can be used as a guiding element or as an orientation point. By letting the visitor learn what to look for (scanning and glancing) the guiding element can bring people along a route, while the orientation point can help with learning your own position within a setting.

> **atmospheres, identity, meaning**
By designing different places with different atmospheres people are able to endow with meaning so they become strong mental anchor points. Places with meaning are potential stronger anchor points then places without. By giving them a specific identity, the place can be easily differentiated from other points.

> **grouping – function distribution**
In order to make sense of the environment people group their visual field and their acquired environmental information in groups. They use gestalt principles to judge what belongs together and what does not.
> architectural differentiation
By making clear distinctions between functions, activities, destinations, etc helps people to separate different entities from each other. This is how the grouping of function (organization) can be communicated (articulation) to the user, so he is able to understand how the building is structured.

> use the structure as framework
The structure of the building functions as the framework in which the floors and the boxes can be placed. Columns can therefore be placed in front of or in a wall or even in a space, as they the structure and the layout can be considered as two different entities.

> views
The views towards the site and from the site are important agents in the urban implementation. Different tools can be used to discover from where the site can be seen, which buildings are blocking the view from the site at which height and what views from the site can be used as an important atmosphere defining character.
> **spatial enclosure**

The spatial enclosure of the building form communicates the functionality of the spaces within the building. This is valuable information for visitors when they approach the building as they already have a good idea of what to expect and how the organization works.

> **path elements**

Specific elements of the path are articulated as they are the building blocks with which the route is constructed.

> **environmental complexity (versus layout simplicity)**

The environmental complexity of the building allows the directing of movement, but also discovering the building. The main route is easy to follow while the places are somewhat hidden allows the possibility to discover the building. Exploring the environment allows a more positive experience with the environment.
> edges

The borders within the building are important transition areas which are designed to be as soft as possible, because they are capable to stop the fluent flow of movement. Especially there is a focus on how the inside is connected with the outside.

ground level implementation | the building is anchored on different levels with different routes. The building opens up towards the railway bridge with an square which (atmosphere) goes into the building. On the park side, the visitor are pulled up the first level with a series of terraces which allow the visitor to easily arrive in the main entrance hall on the second floor.

entrances | the degree of articulation of the entrances corresponds with the degree of publicness
conclusion

The location of the South Bank and dealing with the public domain in the tower typology made it difficult to develop the described wayfinding methodology. These were two factors which drew attention away from the wayfinding theme, which is on itself a tough nut to crack. The implementation of wayfinding theory resulted in a conflict between recommendations or in design decision which were not fundamental as they were only based on single wayfinding recommendations. The wayfinding methodology however does allow for the simultaneous development of the building on different scales (floor plans and detailing) whereby the conflict between recommendations can be watched carefully.

The theory can be found in different aspects of the design proposal. Different interventions on different scales that all helped to communicate how the building is organized are implemented with the wayfinding theory as framework. Within this framework I designed the building which are based on the design patterns. This is not the way to design with the patterns; they should be arguments for certain decisions, but should not dictate the design. The design patterns are to ‘loose’ and scale independent to be used as a strong foundation for important design decisions. So with the complexity of designing it is hard to use the strict guidelines in a bigger scales, but on a smaller scale the decisions have less impact and are therefore more suitable as wayfinding decisions. On the articulation of the building wayfinding can be play a much greater role.

I found out that specific recommendations are less helpful than general recommendations as it can create restrictions. The concept was to articulate the different functions within the organization of the public domain; a wayfinding ideology as it groups the different functions and activities in specific groups. However, all these interventions can be considered as ‘normal’ design decisions, as it is in every design the goal to communicate the intent of the building. The theory let the designer be aware of these known design skills, so that they can be implemented with tact and care. General recommendations can be considered as general design skills which are only described. The strict use of the recommendations is something which is hard to control as it turns out that they can easily negatively influence each other. The correct synergy between the recommendations and the design is in fact the challenge on which is hard to give advice for.

I would like to mention that the recommendations give insight in how the wayfinding process works and creates awareness within design decisions, what on a secondary level will improve the wayfinding abilities of a person within the building.
The research brought great insight in how the wayfinding process works, by what it can be influenced and how it can be applied within a design project to increase the wayfinding performances of potential visitors of a building.

Personal abilities, their mental representation and environmental factors all influence the wayfinding process. Human abilities involved in wayfinding are concerned with how the information is extracted, interpreted and manipulated so it can be used for wayfinding. Especially environmental perception is a valuable asset in the wayfinding process. Gestalt principles, light, the scanning and glancing process are all aspects which should be taken into account in every design project. Transforming this information into a mental representation tells us how the information is modified. Along the way mental anchor points are created and we group the different elements to structure it. By giving identity to certain elements the design can distinguish the differentiation between the five elements of Lynch: path, node, district, edge and landmark. A good imageability of the environment will help to create an accurate representation. Eventually the source of information has to be designed. By making the architecture legible, the building can better communicate what its intent is. Dealing with the environment as a nested environment and designing while guaranteeing visual access, differentiation between building elements, use of signage and layout simplicity, the legibility will be increased. These factors were tested and confirmed through a small empiric research.

The application uses a strict distinction between what people see in a perspective image and the relations between these images; the building has an organization that structures the connection between spaces and therefore the images. This connection should be clarified through the articulation of the different architectural elements. The building should be designed in such a way that the information relevant for the visitor is communicated at the appropriate time and with the correct means through the use of perspectives views.

The answer on the question how this knowledge of the wayfinding process aid in the design of better buildings is multilateral, as it cannot be strictly measured. That is the essence of the design problem; the threshold between complex and a not illegible environment need to be found. But above all, the wayfinding task of orientation, identification and finding your way still should be answered. By letting articulate the organization and intent of the building this can be done much easier.
This approach and the recommendations are used for an architectural design of a big public program on the South Bank in London. It turned out that the recommendations were not able to lead and dominate the design project; basing big impact decisions only on the recommendations can lead to important decisions which are interpretative and not bounded to a specific scale and are therefore not suitable as a design foundation. The recommendations have a greater influence on the smaller elements that are articulated or can be used as an argument to choose for a specific design solution without consequences for the integrity of the whole design. While designing there seemed to be a high degree of general design skills within the recommendations. Design principles are close too general design skills and are therefore logical patterns to use. Having these documented helped to raise the awareness of these skills which can lead to better use of them.

Applying this knowledge in a suitable and efficient manner can aid people in their quest to finding their way through a building. How well this can be done, is hard to measure within the design due to the complexity of the design and the influence of other factors. However, it can be stated that the awareness of the theory and recommendations can make the designer the possible consequences of particular design decisions.

The design test case was an interaction between the design patterns, the location and the typology of the tower. Which are three influential factors that all needed full attention. The design is guided by the design patterns and made concessions with the two other factors. Without the theory the design would have become different on some parts, but not in its foundation. It certainly has influenced the process, but has dominated it. Only in the articulation, at a later stage in the process, it gained more influence. This was allowed, because the impact on other decisions and part of the building was lower.

Conclusively I want to state that the wayfinding theory cannot and should not dominate the design product. The building’s concept is universal, but is developed on ideas found in the theory. This illustrated the friction between the research and the design and how the collaboration between them needs to be ‘soft’. The goal is to make an interesting environment which is also easy to comprehend. The awareness of the wayfinding theory and recommendations can influence certain decision to find this threshold between environmental complexity and legibility. By elaborating more on the how, when and with what, I hope to contribute something to the existing knowledge of wayfinding design. Obviously the recommendations cannot be used in one single design, but should motivate the designer to consider how it’s building is perceived and cognitively stored. The experience and the ease of wayfinding of the user should always be the main objective.
15 reflection

Within this chapter I want to look back on the project and reflect on the problems, methodology and opportunities.

research method

The research method used for the literature research is based on the work of Kevin Lynch (1960) Image of the City and Romedi Passini’s Wayfinding in architecture (1992) and Wayfinding; people, signs and architecture (1992). They form the base which is complemented with different papers from different authors found through the search engine of Google scholar and the TU Delft library. The search structure was defined by the keywords which were forming the main topics as well as searching on papers which used Lynch or Passini as a source. However, the theory did not cover the personal differences in wayfinding knowledge and capabilities connecting to the environment and strategy. I believe there is much to discover in that area.

For testing the theory a small survey was made were people were asked about some general information about their visits to the building and asked to draw a map from memory in less than three minutes. By not giving them any clues to what an expected outcome could be, the input came only from the respondents. This was however only a small exploring research; a next time the interview should be done with people who are not yet familiar with the building. After personally guiding them through the space, ask them to draw a floor plan, the results should be much more interesting. The researcher knows what the person saw and what he or she reproduced in the floor plan. Also the sequence of elements that are drawn can be recorded.

literature review

Looking at the existing body of literature, I concluded that the process of how a cognitive map is acquired and how to design an urban as well as architectural which can facilitate a good wayfinding performance is provided. However it seems to me that the knowledge is somewhat fragmented on the influence of all these different elements have on the observer and till what degree personal abilities contributes to wayfinding performances.

Difficulties arose when the different streams of theory needed to merge to one coherent story. Different definitions and theories had to swept together and synchronized for the benefit of a coherent story. Recommendations on different scales, with different elements and means made it hard to develop a model in which everything could be extracted of. Even now the overall structure remains sometimes vague due to the friction between (strict) guidelines and the complex process of designing which cannot be framed in. By elaborating more on the how, when and with what, I hope to contribute to the existing knowledge of wayfinding design by being explicit about the implementation of this knowledge in the design.
research and design
Within the design the phase I underestimated the complexity of designing. The approach of articulating the organization worked but was not world changing. It did however led to a higher awareness of what the visitor will see while discovering the building.
Probably the same is true for the recommendations. While researching and reflecting the guidelines within in the design, I concluded that they should not be stated as hard as they are. You have to be really careful of using which recommendation where, as they can negatively impact the wayfinding performance on other scales.
That different recommendations can work against each other can be seen in the process; the use of stacked boxes and the shell (march 2013) guaranteeing a certain form simplicity and defined spaces. Based on the wayfinding theory, these elements were perhaps correctly integrated within the design, but did not function well. They were not directly related to the context or the building’s program. At some point they became the restrictions holding back the development of the design. This shows how the application of these recommendations is equally important as the recommendation themselves. By using the recommendations as a base for the arguments, I encountered some fundamental difficulties; the foundation of the theory is loose and can be ambiguous. Compared with making design decisions based on the program, the recommendation allows too much interpretative space.
The concept used in the design is not strictly a wayfinding-based concept. It uses the theory of different districts and elements, but can also considered as a concept which is not related with wayfinding. The research has brought the insights regarding what people see, it explains why things are done and proposes alternatives, but over the long run remain interventions which are done instinctively by the designer. It can favor one particular decision over the other with arguments found in the wayfinding theory. The recommendations should therefore be more considered as an argument for making decisions. Whenever a design decision needs to be made, the recommendations can favor one particular possibility based on the theory. In this way the wayfinding theory does not dictate the design, but ensures its wayfinding performance through sub arguments.
Most of the recommendations are implemented unconsciously as they can be considered as general design skills. Using gestalt-principles to structure our environment is something we do as humans in our visual field, so we do it also in designing. The recommendations made me however aware of these tools, which enabled to me use it with more tact within the design. By emphasizing how these generic design skills are used to create a legible environment, the wayfinding performances of the potential visitors in the building will be improved.
future research
The research and design experiment gave a lot of insight in wayfinding, but there is room for improvement. If I could do it again, the parameters for the design test case (location, program, etc.) should be more focused on the wayfinding itself. The complexity of the South Bank and the difficulties with having a public domain in a tower typology shifted the attention on wayfinding towards these other issues. Within the research itself, more attention should be devoted to the impact different strategies and purposes have on using which recommendation. Depending on the knowledge and the way we extract information out of the environment, we may want use different design recommendation to respond for this specific demand.
architectural legibility
the degree to which the designed features of the environment aid people in creating an effective mental image of the spatial relationships within a building and the subsequent ease of wayfinding within the environment

distinctiveness
that which gives an object or a place its unique identity

declaration
purpose of discovering a new environment

gestalt
organization of visual stimuli into figure and ground

anchor point
element or place which has a dominant position in the cognitive map

habitual movement
strategy that is based on the movement along a well known path

articulation
easily identified spaces, demarcated by shape, color, arrangement, or signage

cognition
process that includes understanding, structuring and manipulating information

identification
concerns means whereby people know that they have arrived at their destination

cognitive map
an overall mental representation of a setting that cannot be grasped from a single viewpoint but that has to be integrated from different vistas

identity
complementary rules by which all environmental information can be classified: identifying that which is distinct (identity) and that which is similar (equivalence)

cognitive mapping
the mental structuring process leading to a cognitive map

image
as a mental representation it can refer to a particular view of an object or an overall view of a large setting (cognitive map)

commute
purpose of a user that involves moving to a familiar destination along a well known route

imageability
the ease with which the spatial layout of a setting can be understood and mapped

decision making
developing a plan of action to go somewhere

decision plan
a mental solution to a wayfinding problem that is developed by the user in form of a plan

decision diagram
a diagram of a decision plan

decision execution
transforming decisions into action and behavior

information processing
generic term comprising the environmental perception and cognition

information overload
a state of general confusion resulting from excessive information
legibility
the ease with which environmental information is obtained and understood.

legibility of space
ease of user in organizing visual information in a space into a coherent basis for action.

locomotion
‘Locomotion requires us to solve problems such as identifying surfaces of support, avoiding obstacles and barriers, and directing our movement toward perceptible landmarks.’

mental image
collection of spatial knowledge about the environment, see image

navigation
coordinated and goal-directed movement through the environment

network pattern
organization of space according to a repetitive geometric law such as the orthogonal grid or the hierarchical network

organization
principle on with which an environment is structured

orientation
a person’s cognitive ability to represent space accurately, to map environmental information at the large scale and to determine the position of the person concerned within that representation.

path integration
strategy where an external landmark is used to orientate and navigate through the environment

perception
the process of obtaining, organizing and making sense of the information through the senses

perceptuocognitive behaviour
behavior created due to a condition of information overload

piloting
strategy where one moves from one mental anchor point or landmark to another

quest
purpose to find an unknown specific destination in the environment

scanning
visual sweeping intended to get an overall idea of a setting

spatial cognition
retaining, understanding, structuring and manipulating information of a spatial nature

spatial organization
the relationship among spaces of a setting; the typology of spatial organizations is equivalent to that of circulation systems, that is: lineair, central, composite and repetitive (networks)

spatial orientation
having an adequate cognitive map of a setting and being able to situate oneself therein

spatial planning
design phase to determine the layout of the setting at an urban landscape and architectural scale

spatial representation
see conitive map

wayfinding
a person’s ability, both cognitive and behavioral, to reach spatial destinations and solve spatial problems; the information-gathering and decision-making processes people use to orient themselves and move through space spatial problem solving comprising three independent processes: decision making, decision execution and information processing


Hunter, Susan, ‘spatial orientation, environmental perception and wayfinding’ in *design resources DR-14. center for inclusive design and environmental access*, Buffalo, 2010.


appendix
Do you come here ...
☐ for one specific function ☐ to visit the building ☐ daily

Are you familiar with this building? (on a scale from 1 till 5)
not familiar       1       2       3       4       5 familiar

How many times did you visit this building
☐ 0-3 ☐ 4-7 ☐ 8-10 ☐ 11-14 ☐ 15+ times

Do you understand the layout of the building? (on a scale from 1 till 5)
low understanding ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 high understanding

How would you describe your level of knowledge of this building? (on a scale from 1 till 5)
low level ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 high level

What is the most important factor in understanding the layout?
☐ a simple structure ☐ different identities ☐ clear overview ☐ other ....................

Can you draw a floor plan of the ground floor from memory and mention the 3 important elements? (in ~3 min)

ground floor

Thank you!

This questionnaire is part of the graduation research project ‘directed movement’ conducted by Maarten van Zupten, Delft University of Technology. The collected information is anonymous, handled with care and will not be distributed to third parties.